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China Report

SCIENCE AND TECHNOLOGY

SPECIAL NOTICE INSIDE

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8 MAY 1987

CHINA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

PEOPLE'S REPUBLIC OF CHINA

NATIONAL DEVELOPMENTS

/9987

NATIONAL DEVELOPMENTS

ZHOU GUANGZHAO URGES MORE EXCHANGES WITH HONG KONG

OW071950 Beijing XINHUA in English 1431 GMT 7 Apr 87

[Text] Beijing, 7 April (XINHUA)--China's mainland and Hong Kong should strengthen their cooperation in scientific and technological research, said Zhou Guangzhao, president of the Chinese Academy of Sciences, here today.

Zhou said all research institutes of his academy are open to Hong Kong and Macao deputies to the National People's Congress and members of the National Committee of the Chinese People's Political Consultative Conference, adding that he welcomes them to visit any of his institutes at any time.

He made the statements at a discussion with NPC deputies and CPPCC National Committee members from Hong Kong and Macao this afternoon.

Zhou said Hong Kong has easy access to international scientific information, abundant funds and a high level of management, while the Chinese Academy of Sciences has a large contingent of scientists and rich research results. If the two sides cooperate well, he said, it will benefit the economies of both the mainland and Hong Kong and Macao.

Over the past few years, the president noted, scientific and technological cooperation between China's mainland and Hong Kong and Macao has grown steadily. Academic exchanges conducted each year involve several hundred people.

The Institute of Energy under the Chinese Academy of Sciences and the Hong Kong Polytechnic College have constructed a model for the utilization of solar energy in Shenzhen. The Academy's Institute of Oceanography and the Hong Kong Polytechnic College hace also conducted research into the waves and typhoons on the South China Sea.

The Academy has also worked out a plan with the Hong Kong Chinese University to study the protection of the ecology at Daya Bay and the possible impact of the nuclear power plant to be built there.

From last year, mainland scientists began to make contacts with Hong Kong industrial and business circles and organized seminars on how to help Hong Kong to control pollution by small and medium-sized enterprises.

Zhou expressed the hope of further expanding such cooperation on the basis of equality and mutual benefit.

Among those present at the meeting today were 15 professors and senior engineers of the Chinese Academy of Sciences, including Lu Jiaxi and Yan Dongsheng.

/12232
CSO: 4010/2017

SCIENTIFIC EXCHANGES TO CONTINUE AT 'FAST PACE'

OW270224 Beijing XINHUA in English 0210 GMT 27 Mar 87

[Text] Beijing, 27 March (XINHUA)--China's scientific and technological exchanges with foreign countries will continue at a fast pace this year and during the rest of the Seventh 5-Year Plan (1986-1990).

"There will be 36 international academic conferences to be held in China this year by the China International Conference Center for Science and Technology," the paper said by quoting Wu Ganmei, the center's executive.

They will include one on hospital management, another on the application of computers to chemical research and education and third on noise control.

During the next 4 years, Wu said, there will be at least 112 international academic conferences held in China's big cities, including Beijing, Nanjing, Xiamen and Xian.

Since the founding of the center in 1985, it has arranged 86 international academic meetings involving 140 delegations and more than 10,000 scholars and specialists.

"We play the role of a bridge," Wu said, "China's individual science and technology societies now still have many difficulties organizing international meetings. The center can organize all 140 national professional societies and provide proper conditions for them."

The center organizes symposiums, workshops, training courses, visits for scientific and technological exhibitions.

/12232
CSO: 4010/2017

CPPCC DEPUTIES STRESS ROLE OF SCIENCE, TECHNOLOGY

OW0309235 Beijing XINHUA in English 0847 GMT 3 Apr 87

[Text] Beijing, 3 April (XINHUA)--Scholars and scientists attending the current session of the Chinese People's Political Consultative Conference [CPPCC] National Committee here once again argue that science and technology constitute the key to the realization of China's modernization.

In group meetings over the past few days, Qiao Peixin, former vice governor of the People's Bank of China, said that when talking about increasing production, certain people would ask to increase investment in capital construction. "Why has Japan developed rapidly since the last war and why have our cities of Suzhou and Wuxi grown faster than others? In my view, science and technology play a pivotal role. They are the key to realizing our country's modernization," he reasoned.

Professor Zhou Lisan, honorary director of the Nanjing Institute of Geography under the Chinese Academy of Sciences, charged that the money spent on basic research is too little. Last year only 100 million yuan (U.S.$27 million) was allocated to the Natural Sciences Foundation, and 70 or 80 percent of the sum was used on scientific research.

Hou Xianglin, deputy director of the Science and Technology Commission under the Ministry of the Petroleum Industry, and Jiang Lijin, research fellow at the Institute of Photochemistry under the Chinese Academy of Sciences, suggested that more attention be paid to basic research.

Professor Qian Linzhao from the Chinese University of Science and Technology said that China is presently one of the leaders in the research of superconductors, and competition worldwide is very fierce. He called for concerted efforts by Chinese researchers in this field to make new breakthroughs and put the research findings to application as soon as possible.

/12232
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NATIONAL DEVELOPMENTS

FUTURE OF SCIENTIFIC RESEARCH INSTITUTIONS

Tianjin JISHU SHICHANG BAO in Chinese 28 Jan 87 p 1

[Article by Hu Ping [5170 1627], Ye Dan [0673 0030], and Liu Zhong [0491 0112]: "Scientific Research Institutions Should be Allowed to Pursue Different Courses"]

[Text] As the reform of the economic, scientific, and technical systems becomes more thoroughgoing, particularly as market mechanisms are strengthened, the separation and reorganization of China's scientific research organizations are inevitable and are actually happening spontaneously. There is currently an explosion of mergers between enterprises and research institutions, which is good. Some institutions and enterprises have come together forming joint scientific research and production organizations of different kinds and at different levels. Some technically powerful institutions are in the process of becoming technical development centers for a particular industry. A number of independent or factory-affiliated research centers have oriented themselves to small and medium-sized enterprises and turned themselves into regional technical development centers for these enterprises. Other independent research institutions have been cooperating with small and medium-sized enterprises on the basis of equality and mutual benefit. There have also appeared a number of new technical development companies of a scientific research mold as well as inter-industry, inter-sector, and interregional scientific research-production "trusts." In effect, we may consider these forms the prototypes of future research organizations. While they appear in myriad forms, the bulk of research organizations are all pushing to integrate scientific research with production and are fighting for economic self-sufficiency. Accordingly, it should be a big part of the reform of creative scientific research organizations in the days ahead to follow this trend and further strengthen the union between scientific research institutions and enterprises and make a mighty effort to develop industrial and regional development centers.

It should be noted that the overwhelming majority of China's research institutions have led a separate existence outside of enterprises, resulting in a schism between scientific research and production. To put an end to this situation, it is necessary to merge some research institutions with enterprises organizationally. For the former, this is also a way out. Nevertheless, it is unrealistic to require a majority of enterprises to embark

on this road in the near future. The restructuring of research institutions should follow this principle: use a multitude of forms, make the best u[illegible] of the circumstances, create conditions, and when conditions are ripe, [illegible]ess will come. The presence of all kinds of independent, closed re[illegible]rch institutions was unavoidable under the old economic system, what with its fragmentation and departmentalism running rampant in sectors and regions. The basic objective of reforming the scientific and technical system is precisely to put an end to this situation and facilitate the integration between scientific research and production. But such integration can take all forms and shapes, each with its own advantages. The incorporation of an institution into an enterprise is just one of these forms; it is not the only form. It works only when there is a mutual need on the part of both the institution and the plant, when it is done on a voluntary and mutually beneficial basis, when the labor of technical personnel is respected, and when technical strengths can be exploited. If we force a merger between an enterprise and a research institution in the absence of these conditions, it will only produce negative results. Behind Beijing's abolition of level 2 companies was the plan to incorporate 20 odd research institutes into enterprises. But the institutes demurred because conditions for such a merger did not exist. In the end, they were allowed to keep their independent existence and gradually evolve into industrial centers and technical development centers for small and medium-sized enterprises. What is more, the research institutions of many enterprises have asked that their relationship with the latter be ended. Hundreds of scientific and technical personnel at the research institute of Beijing No 1 Machine Tool Plant, for instance, were idled because the enterprise had no technical demand, so they joined one another in demanding that the unit be separated from the enterprise. After separating from its parent company, the Beijing Powder Metallurgy Institute became self-managed, oriented itself to society, and made fresh progress. According to a survey on 190 assorted research institutions, only 3 percent favored merging with an enterprise, with the remainder all choosing other paths. Most institutions are reluctant to join enterprises mainly because enterprises these days are sluggish, have no demand for technology, and do not take scientific research seriously. Institutions fear that they may be dismembered and "eaten up" after the merger and that scientific research personnel would be regarded as "second-line people" and their initiative stifled.

Therefore we should go about reorganizing scientific research institutions on a case-by-case basis and make the most of the circumstances. No uniformity should be imposed across the board. For the nation as a whole, the future of research institutions should be diversified. Some may become the "national contingent;" others, the comprehensive research institutions of a sector or region, joint scientific research-production organizations, enterprises of a scientific research variety, or industrial or regional development centers. Yet others can be merged with enterprises or separated from them. Then there are enterprises which are of a low standard and unqualified and cannot carry out creative research. They should be closed, suspended, merged, or reorganized, with a view toward eventual elimination. The relevant departments in charge should consider the present situation in the light of the short- and long-range demands of economic, scientific, technical, and social developments; create conditions; and provide individual guidance to further deregulate and invigorate research institutions so that all of them can bring out their strengths and really find a niche for themselves as they pursue the general goal of serving the economy.

12581
CSO: 4008/2071

SCIENTIFIC RESEARCH MANAGEMENT IN LARGE ENTERPRISES

Beijing KEJI RIBAO in Chinese 2 Feb 87 p 3

[Article by Chen Chongxuan [7115 1504 3551]: "Lessons from Management Reform in a Sichuan Machine Tool Plant"]

[Text] An enterprise is where science and technology meets the economy. It is also where science, technology, and the economy develop. A large enterprise, in particular, includes both a production system and a scientific research institute and is effectively a joint scientific research and production complex. As science and technology came to serve national economic development and the market became ferociously competitive, both the development of new technology in factories and product succession have made rapid progress, prompting enterprises to devote even more human, material, and financial resources to scientific research and applications. Nevertheless, scientific and technical management in enterprises is still ridden with problems. This is because production and science and technology, are incompatible with as well as dependent on each other. We should take these measures:

Put Scientific Research Ahead of Production

Compared to production, scientific research takes more time, is more difficult and more prone to failure, and produces no results in the short term. Whenever production gets busy, scientific research is often pushed aside. It is not uncommon for plants to pursue production at the expense of scientific research. The perception is that scientific research is a soft target and not too important. "If you cannot finish scientific research this year, there is always next year." We have faced this problem squarely since 1982. First, we improved the scientific research management system putting the chief engineer in charge of scientific research. The office of the chief engineer exercises general control over such daily matters as the determination of scientific research topics, planning, implementation, finance, and rewards. There are full-time scientific research management staff in each research institute. Departments handling business, production, finance, materials, equipment, and so on also have full or part-time managerial workers. Of particular significance is that production departments have scientific research and production planners to ensure that scientific research channels flow smoothly and to lighten the administrative burden of project leaders. Also, a

scientific contracting system has been instituted in the plant. When a research unit requires a set of equipment or spare parts that cannot be produced by the unit itself, the factory must organize its production. That is, the unit signs a production contract with the business department, which will then enter the production channels. The production department sends the production plan to the workshop and also evaluates its work. Odd jobs can be sent to the workshop directly through scientific research planners in the production department. Whatever cannot be produced in-house will be made outside by the production department in cooperation with other factories. In 1983, we signed 33 scientific research production contracts, which were fulfilled at a rate higher than that for product production contracts. As a result, such projects as cross-head universal axle, zhangtao research, concave tooth wormshaft were completed. They also passed evaluation and have been favorably received by the ministry and commission.

Establish a 3-in-1 System Combining Goal-Setting, Evaluation, and Reward

We should define goals clearly when setting a research topic, evaluate the project in the course of research, and reward the people involved upon its completion. This effectively ensures that a project will be completed. In scientific research, reward takes the form of a supplement determined by the amount of labor expended. At present the higher autnorities hand out scientific and technical progress awards once a year to a handful of key projects, but the enterprise should reward the large remaining number of completed projects. Goals should be linked to bonuses as soon as a project is assigned. A long-range project should be divided into stages, each with its own particular set of goals. When the goals are fulfilled and report made at the end of a stage, rewards should be given out. Every quarter a project should be evaluated in light of the plan and classified in accordance with this fourfold scheme: projects whic are ahead of schedule, progress according to schedule, have fallen behind schedule, or have been put on hold. Projects which fall into the latter two categories would have their monthly comprehensive bonuses deducted. The chief engineer regularly convenes scientific research meetings to supervise and speed up the fulfillment of assigned tasks. All project groups are required to make monthly progress reports. Scientific research reward is more than the flower on the brocade, that is, a bonus issued for a project well done. It should also be the charcoal in snowy weather, a timely boost in the middle of a project to encourage the workers to bring it to fruition. After years of practice, the completion rate of scientific research projects at this plant has gone up. In 1982, 22 projects were either completed or reached their stage goals. The corresponding figures for 1983 and 1984 were 35 and 34, respectively. In 1985, 43 projects were completed or reached their stage goals, including one involving the technology of computer-aided steel casting.

Strengthen Financial Control

Traditionally this plant's scientific research funds came in part from the three national scientific and technical subsidies and special contract appropriations, and in part from the enterprise transformation fund, management fund, and production development fund. Financial management here was a mess 4 years ago. Nobody was specifically put in charge. Special funds

were not used for the special purposes intended. Scientific research funds were diverted elsewhere. Scientific research that needed to be done was put on hold for lack of funding. After positions were created in the financial department to handle scientific research funds and the office of the chief engineer was given overall responsibility, the chaos of financial mismanagement was gradually sorted out. Because financial professionals did not understand the substance of a particular project they had difficulty ensuring that special funds served the special purposes intended. By involving technical personnel in financial control, we end up with a unified system that is not overly rigid, manage to use special funds for the purposes intended, and can evaluate the rationality with which funds are used. Also, related projects of the same kind can regulate fund use between themselves. Since adoption, centralized management has borne good results. In 1985, we drew up a plan for a system of economic contracting for scientific research projects. Briefly it is supposed to work like this. When a unit is assigned a project, it also undertakes to come up with the funds for it. Upon the project's completion, the unit is paid a certain percentage of the value added as a reward. But since the plant involves a wide area, the system cannot be implemented. We need to work narder to carry out pilot projects and reform in the future.

Pay Attention To the Training and Development of Personnel in Scientific Research Management

A large-scale plant or enterprise needs a group of engineering and technical personnel schooled in business to exercise command over policy-making and act as a go-between to keep things flowing smoothly so that functions like planning, organization, command, coordination, and control are carried out to the best effect. At present our factories and enterprises are stuck at the stage of management by experience and qualitative management and are in large measure dependent on the subjective initiative and standards of the managerial personnel. The presence or otherwise of a group of energetic enthusiastic workers to take care of scientific research management are a critical link in the entire implementation process. Leaders at all levels must take the training of technical and managerial cadres seriously and mobilize their full initiative. Now that national scientific research funding is tied to tasks and applied research revolves around enterprises, enterprise personnel in scientific research management have a more complex job handling lateral associations with cooperating units like colleges, universities, and specialized research institutions. It is thus vital that such personnel are properly trained.

12581
CSO: 4008/2071

NATIONAL DEVELOPMENTS

HIGH TECHNOLOGY PROGRAM TO BEGIN IN 1987

OW030851 Beijing XINHUA Domestic Service in Chinese 0635 GMT 2 Apr 87

[By reporter Meng Xiangjie]

[Text] Beijing, 2 April (XINHUA)--The CPC Central Committee and the State Council recently approved a program for research and development in high technology and decided to implement it this year.

Premier Zhao Ziyang mentioned this program in his government work report to the Fifth Session of the Sixth NPC, and not long ago met with members of various expert committees of this program, encouraging them to put their heads together and carefully organize personnel to tackle difficult problems.

According to the department concerned, since March 1986 efforts have been made to work out an outline under the direction of the State Council Leading Group for Science and Technology. This is an important policy decision concerning the continued development of our country's economy and science and technology at the turn of the century. Currently, the new technological revolution worldwide is changing the mode of production and structures of industries and will definitely bring about another gigantic leap in the development of productive forces. Any country in possession of high technology will greatly raise its productivity, profoundly alter its mode of production, and quicken its social development.

A responsible person of the department concerned said: For a fairly long period, our country will be unable to develop high technnology in an all-round way and on a large scale. To fulfill the strategic goal of quadrupling our annual industrial and agricultural output values by the end of this century, most of our scientific and technological forces should firmly and without hesitation work toward this goal. However, we must also pay close attention to the influence of high technology on the future economic and social development of our country and organize a small but elite force of scientists and technologists to work in selected high-technology fields that will greatly affect the future of our economic development to keep abreast of the rest of the world and to make new breakthroughs.

According to the sources, the outline of the program for research and development in high technology covers more than 10 major projects in 7 technological fields,

resulting from careful examination and consideration by experts in various fields. They are: biological technology, including new strains of animals and plants that are high-yielding, of excellent quality, and disease-resistant [kang ni 2123 6627]; new medicine, vaccines, and genetic treatments; protein engineering; astronautic technology, including large carrier rockets and research and development in space technology for peaceful purposes; information technology, including intelligent computer systems, photoelectronic instruments, photoelectronic system integration technology, and information procurement and processing technology; laser technology, including laser equipment of high performance and quality and its application in processing and production; automation technology, including computerized automatic assembly lines and intelligent robots; energy technology, including electricity generating technology using magnetofluid fueled by coal, and advanced nuclear reactor technology; and new material technology, including high-performance structural materials and materials of special functions. It is hoped that research and development in these projects, which are the focus of international interest, and any information discovered will aid progress in related sciences and technologies.

The responsible person of the department concerned stressed: The outline of the program for research and development in high technology is for civilian use. The program will be implemented in the spirit of reform, in the course of which new experiments in management will be conducted. Investment in the program will be provided and controlled by the state, rather than allotted to various departments and localities. Central and local departments concerned should provide necessary services. The management of projects will be tendered by or commissioned to the most capable units or experts, to whom funds will be directly allocated. In implementing the outline of the program for research and development in high technology, it is necessary to act as a team, use well the available testing equipment and work conditions, and utilize various forms of lateral cooperation. We must rely on our own strength and take advantage of our strong points to tackle problems. At the same time, we should make full use of the favorable conditions provided by our policy of opening to the outside world and, through mulitlateral and bilateral relations between governments and through various people-to-people channels, promote international cooperation and exchange of various forms to ensure implementation of the outline of the program for research and development in high technology.

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REFORM OF DEFENSE SCIENTIFIC, TECHNICAL SYSTEM

Beijing KEJI RIBAO in Chinese 8 Feb 87 p 2

[Article by Yang Jiapei [2799 0116 0160] and Xie Mingbao [6200 0682 5383]: "Important Reform in the Scientific and Technical System in National Defense"]

[Text] The State Council and the Central Military Commission have approved the adoption of a new funding system for scientific and technical research in national defense starting this year. A contract system operating under national guidance planning would be initiated with regard to project management in defense scientific research. This is a major reform measure for the scientific and technical system in national defense.

For 30 years after the national defense industry was set up in the 1950's, scientific research funds were managed in a uniformly administrative way: it was a system under which one "was reimbursed for what one spent." This management system once had a positive effect on scientific research in national defense. As the restructuring of the economic, scientific, and technical systems was furthered, its many shortcomings became more and more evident. Because the important functions of economic regulatory mechanisms and legal devices were overlooked, inefficiency and the habit of "eating out of the common pot" were widespread. No longer could the system meet the demands of the continuous growth of the national defense armaments industry. The latest reform is based on the characteristics of defense-related science and technology. Apart from continuing to stress the features of guidance planning, the new system introduces economic regulatory mechanisms and legal tools and injects new vigor into the development of science and technology as they relate to national defense, making them more dynamic. Essentially the reform consists of the following:

1. Scientific research funds will be managed in accordance with the characteristics of different scientific and technical activities. The new funding system distinguishes between three types of funds: weapons and equipment research and development [R&D] funds, applied and basic research funds, and technical basic funds, and treats them differently. Most of the weapons and equipment R&D funds are allocated to user departments in the armed forces. Through contracts and agreements, these departments can combine economic and legal tools with administrative planning mechanisms and take part in the management of weapons and equipment R&D projects. This system

increases the control of user departments over R&D as well as their responsibilities and obligations, a departure from the longtime practice in the past whereby people who "ordered weapons did not have to pay for them." Research departments too have come under heavier pressure. Only by constantly improving their managerial standards and adopting new processes and technology would they be able to undertake and complete a task. In the allocation of applied and basic research funds and technical basic funds to industrial departments, the new system also requires that horizontal contracting, the assignment of a task to a unit and holding it responsible for its completion, allocation on the basis of merit, and other managerial methods be adopted, depending on the actual circumstances of a scientific research project, thus undermining the "eating-out-of-the-common-pot" system at its source. This sets the stage for the transition of the two major types of defense-related research--weapons and equipment R&D and applied and basic research--from the old management system under which funding was divorced from management to management by objectives based on research achievements. Through this transition, a new cooperative relationship will emerge between user departments in the armed forces and industrial departments responsible for R&D, and between departments in charge of R&D and units that actually perform the detailed work of research. Responsibilities, rights, and interests will be linked organically, and both parties' initiative will be mobilized strongly with the result that funds will be used more effectively.

2. Improve macroeconomic management and adjust the proportionate relations between different types of funds. The new system brings about a unity in terms of management between defense-related research tasks and funds. This unity will do more to help implement the principles and policies regarding the development of weapons and equipment. For example, it is now possible to control and adjust the ratio between applied and basic research funds and weapons and equipment R&D funds more effectively so that in a few years we will be able to intensify control over preresearch inputs.

3. A contracting system within the framework of national guidance planning has been introduced in weapons and equipment R&D. With the special commodity attributes of weapons, equipment, and military technology as its starting point, the "Provisional Regulations for Weapons and Equipment R&D Contracting" give national statutory form to the weapons and equipment R&D contracting system. In China, equipment R&D takes place under strict government control effected through state command planning. In view of this, the provisional regulations require R&D contracts to be based on long- and medium-range plans approved by the national government. Contracts already signed should be guaranteed by the annual plans of departments in charge of R&D. Both parties to a contract must take into consideration the general need to speed up weapons development and establish bilateral relations on the basis of equality, mutual benefit, consultation, consensus, equal value, and compensation. Scientific research achievements belong to the state.

Before the new funding methods and weapon R&D contracting system were announced, there had been 2 years of deliberations and testing on this reform in defense-related scientific research. Practice suggests that this key reform will significantly quicken the stride of China's defense-related R&D toward scientific management.

(2581)
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SUCCESSFUL SATELLITE RECOVERY PROGRAM PRAISED

Beijing HANGTIAN [SPACEFLIGHT] in Chinese No 1, 26 Jan 87 pp 2-4

[Article by Chen Zhiqiang [7115 2535 1730]]

[Text] On 11 October, 1986, the director of China's Space Technology Institute, Min Guirong, announced another successful satellite recovery operation. So far, China has maintained a 100 percent success rate of satellite recovery.

It is known from daily experience that even retrieving a kite in the wind is a very difficult task; one can imagine how difficult it must be to retrieve a heavy satellite from several hundred kilometers above the earth. According to authoritative sources, the Soviet Union, the United States and China are the only countries in the world today that possess the technologies for satellite recovery. The Soviet Union and the United States both have encountered failures in their recovery operations; China on the other hand, has successfully launched and recovered eight retrievable satellites since 1975. All these satellites returned to earth according to plan after orbiting for 3 to 5 days, and landed safely in one of China's interior landing sites.

"How did the Chinese engineers accomplish this miracle?" Recently this reporter posed the question to the chief engineer of the Ministry of Aerospace, Wang Xiji. The 65-year-old chief engineer is a pioneer of China's satellite recovery business and an authority on the development of retrievable satellites. His reply was straightforward: "In order to ensure the success of satellite launches and recoveries, a fundamental rule is to improve the overall reliability of aerospace products, which in the broad sense includes hardware reliability as well as human qualities." Then speaking in Mandarin with a slight Yunan accent, he proceeded to tell this reporter stories rarely known to the general public.

The development of China's retrievable satellites began in 1966. In designing these satellites, scientists and engineers applied the principles and methods of system engineering from the start; they primarily emphasized optimizing the overall configuration of the satellite system rather than insisting on having the most advanced component designs. Under this design guideline, even though some of the individual components were not quite up to par, the overall performance was very good. For example, the impact point

of the satellite was controlled to within a radius of about 10 km, which is considered highly accurate even by international standards. In a humorous tone, the chief engineer said: "If we did not have the confidence of controlling the impact point to such high accuracy, we would have abandoned the method of land retrieval, because a small error in the re-entry velocity or re-entry angle of the satellite can result in an impact error of 1,000 kilometers. Thus, a slight mistake in controlling the satellite may cause it to land in foreign territory and therefore become other country's property.

Our goal is to land the satellite safely and predictably in the designated impact zone. To achieve this goal, scientists and engineers impose very strict reliability requirements on the components--the failure rate is controlled to levels of 10^{-4}, 10^{-5}, or even 10^{-6}. On the subject of design reliability, the chief engineer stood up, his voice filled with excitement, and said: "Design reliability and product quality are the two essential factors for success. With poor system reliability, even the highest-quality component will not be able to perform its function. In system engineering, advanced technology does imply high reliability; the failure of a single screw or a single lead wire may destroy the entire satellite. It is regrettable that the importance of the reliability problem has not been adequately acknowledged by the industrial community of this country. Based on the experience of China's aerospace programs, the probability of success is much higher if emphasis is given to the overall system reliability in the product design. To improve product reliability, we must rely on advanced design concepts." To illustrate this point, the chief engineer described the following examples.

In designing the electrical fuse used on China's retrievable satellites, the reliability index was 0.9999, which is generally referred to as "four nines"; however, due to practical constraints, the actual fuse unit only had a reliability index of "two nines". Therefore, the designer connected two fuse units in parallel to achieve the required design index.

A retrievable satellite is a complex vehicle which has very strict requirements on product quality; all components of the satellite must be of high quality, high precision and high reliability. To satisfy the test requirements, each link in the development process on the ground must be of high quality and high precision in order to ensure reliable operation in space. On this project, scientists and engineers faithfully followed the directive of the late premier Zhou Enlai so that every person, every link and every process would live up to high standards to ensure overall product quality. In 1975, during the integrated test of China's first retrievable satellite, the horizontal gyroscope which controlled the satellite's attitude suddenly suffered a drop in precision, but then recovered after a short time. Trying to track down the ause of this problem, the test personnel carefully inspected the unit and found a loose wire colliding with the counter weight on the outer gimbal of the gyroscope. Having discovered the cause, this "hidden defect" was quickly corrected.

In order to improve the reliability of the overall system, a series of effective quality control standards have been established. Specifically, the standards require that any modification of the satellite configuration must be verified, ground-tested, and approved by the chief designer before it can be implemented; all the electronic components must be subject to unit screening and aging tests in order to remove the units that fail prematurely; after assembly and test, the satellite must be subject to an integrated vibration test before delivery; the critical components are further subject to second and third quality-control inspections.

China is a developing country; it cannot afford the huge expenditures to conduct repeated tests with real articles as the Soviet Union and the United States do. We must try to derive maximum benefits using the limited funds available. Therefore, before a satellite enters the test phase, Chinese scientists and engineers use the method of simulation to conduct tests on the ground on in the atmosphere in order to study the performance of the satellite during launch, during operation and during recovery. One of the key technologies of satellite recovery is the on-board parachute. Satellite parachutes must meet much more stringent design requirements because when the satellite descends to an altitude of 10-20 km, it is still traveling at a speed of 200 m/s, which is equivalent to the flight speed of conventional civilian aircraft. If the satellite collides with the earth at this speed, it would break into pieces. The function of the satellite parachute is to slow down the satellite so it can land safely at a very low speed. In an attempt to understand the "behavior" of the satellite parachute, scientists and engineers spent 4 years conducting more than 50 tests at high altitude (above 11 km), medium altitude (above 6 km), and low altitude. During these tests, some of the simulated objects got tangled on tall trees, some impacted on rocks, and others were buried in sand. Based on these test results, they continued to improve the design until the parachute and the simulated object landed safely under all conditions. By developing a thorough understanding of the parachute performance, the safety and reliability of China's satellite recovery operations are greatly improved, and the dream of retrieving a completely undamaged satellite module has become a reality.

The chief engineer further told this reporter that the launch and recovery of satellites is a huge system engineering task; it involves the satellite, the carrier rocket, the launch site, the telemetry and control network and other subsystems. It also involves more than 10 different departments at the central and local levels. Within such a large system, product quality and reliability alone are not sufficient to ensure a high success rate; we must also have the dedicated cooperation and responsible participation of all personnel.

The development and test of retrievable satellites is like a 1000-meter relay race. The success of the project depends on many processes linked together; a delay in one of the links will affect the entire project. In the history of satellite development over the past 20 years, some technical personnel left their hometowns to avoid the political turmoil, and dedicated their carreers to the development of on-board cameras; others ignored the danger of the Tang

Shan earthquake and continued to work overtime in order to complete the modification of the satellite ablation structure. On 7 December, 1976, just 2 minutes before launch, the swing arm of the launch tower stopped functioning. At the risk of losing their lives, three soldiers rushed out of the underground shelter, dashed to the launch tower, and corrected the problem. Thus, a major incident was avoided, and the satellite was successfully launched on schedule.

Because of the careful and detailed attention given to satellite design and operation by the scientists and engineers, 1986 was a successful year for China's aerospace program while the two superpowers suffered many set backs.

At the conclusion of this interview, the chief engineer made this cheerful remark: "Several years from now, historians will probably write: during the unlucky year 1986 for world space programs, China was the only country where significant progress was made."

3012/9738
CSO: 4008/35

COUNTRY DRAWS UP NATIONAL PROGRAM TO COMBAT CANCER

HK100412 Beijing CHINA DAILY in English 10 Mar 87 p 1

[Report by staff reporter Wen Jia]

[Text] For the first time since the founding of the People's Republic, China is drawing up its national program to combat cancer--a disease which is said to claim 17 lives every 10 minutes in this country.

The program, to extend till the end of the century, is aimed at reducing the incidence of cancer, cutting the death rate and improving patients' lives in the later stages of the disease. It is expected to be launched later this year.

Experts believe cancer now is the No 1 killer of Chinese aged between 20 and 59, a group representing about 40 percent of the population. It ranks the third--next only to heart trouble and cerebrovascular disease--for all mainland Chinese.

Chen Miaolan, head of the Cancer Control Agency under the Ministry of Public Health, told CHINA DAILY over the weekend that the program would include setting up a three-tier network for cancer prevention and treatment. "Efforts will be made in all walks of society to fight cancer," Chen said.

"We'll try to coordinate with other organizations to improve people's living and working conditions and dissuade them from smoking, drinking excessively and eating too many pickled and smoked foods," she said.

But first, offices of cancer control will be opened or strengthened in the 29 provinces, municipalities and autonomous regions of the Chinese mainland, especially in high-incidence areas.

More cancer hospitals and sections specializing in cancer prevention in ordinary hospitals will be added to the present 26 cancer hospitals and institutions in the country, which fall far short of needs. And more medical personnel will be trained.

A national data bank will be built in Beijing to monitor cases and the death rate, and facilities for cancer prevention and treatment will be improved across the country.

Chen said that they would concentrate on the early discovery, diagnosis and treatment of cancer patients, which are the keys to saving or prolonging lives.

Under the Seventh Five-Year Plan, China will see 37 research projects completed on the prevention and treatment of cancer, according to Li Liandi, director of the Office of National Cancer Control.

China is thought to have 900,000 deaths from cancer a year now compared to 700,000 in the mid-1970's, when the country conducted its first national medical survey.

The past 10 years have seen little change in the death rates from stomach, esophagus and liver cancer but there have been increases in cancer of the lung, intestines and breast, Li said.

China has achieved much in cancer research in the past years and is approaching or exceeding the world's advanced levels in treatment, Chen Miaolan said. But the country is still poor in its prevention work and facilities for treatment, especially in the countryside and remote areas, she added.

In Shanghai, where facilities for cancer control are among the best in China, only 1 to 3 percent of liver, lung and esophagus cancer cases and 4 to 6 percent of stomach and intestinal cancer cases were diagnosed at their early stages in early 1985, according to the city's medical statistics.

Chen attributed the low rate of early diagnosis to the shortage of cancer hospitals and the unpopularity of effective methods in the cancer divisions of ordinary hospitals, where about 90 percent of cancer patients are treated.

"We are now spending a large part of our limited funds on more and better experimental units in high-incidence areas and on spreading advanced experiences and techniques," Chen said.

"We are also open to the achievements in cancer treatment in other parts of the world," she said.

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CSO: 4010/1014

MEDICAL INSURANCE OFFERED ON TRIAL BASIS

OW081221 Beijing XINHUA in English 0926 GMT 8 Jan 87

[Text] Beijing, 8 Jan (XINHUA)--China is now offering medical insurance on a trial basis in some parts of the country, according to today's HEALTH NEWS.

According to the report, "the service is designed to prevent the spread of disease and cover children and pregnant women in rural areas and high medical risks in cities."

In north China's Hebei Province, now more than one million children are insured under a planned immunization program. The service, paid for by individuals, is offered by rural doctors and has helped raise immunization rates. Now 81 of the province's 86 counties offer the service and report 90 percent of the children have received regular inoculations against major children's diseases.

In northwest China's Gansu Province, health care insurance covers women during pregnancy and childbirth and children under seven. For a one-time premium of 10 yuan (2.70 U.S. dollars), a newly-married woman can receive regular pre- and post-natal check-ups, and all children under seven will receive inoculations.

In Zhejiang Province, 160,000 residents have taken out medical insurance policies and in a small town near the Shenzhen Special Economic Zone, more than 12,000 workers and village dwellers have become policy holders. Some insurance premiums are subsidized by local governments, village committees, and factories and others paid directly by individuals. The insurance service covers all medical expenses, and half of inpatient room and board charges and physical examination fees.

In Chongqing, Sichuan Province, 19 hospitals now offer insurance policies for pregnant women and newborns.

HEALTH NEWS said, "Medical and health care insurance has helped reduce the financial burden on the state, collectives and individuals, and has broad prospects for development."

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CSO: 4010/1014

LIAONING OFFICIAL ON DEVELOPING MARINE RESOURCES

OW102034 Beijing XINHUA in English 1606 GMT 10 Mar 87

[Text] Shenyang, 10 Mar (XINHUA)--Northeast China's Liaoning Province, a heavy industrial center, is encouraging all foreign investors as well as individuals and collectives to invest in developing the province's marine resources, Deputy Governor Lin Sheng said here today.

He said that the province is organizing a marine research institute to work out a development program, and rules and regulations for managing the marine resources.

The province organized more than 500 experts to survey the marine resources beginning in 1980.

According to the survey results, the deputy governor said, the provincial government has put forward some tentative ideas about the development of the offshore resources. This includes building a seaside tourist zone along the coast, opening offshore oilfields and petrochemical plants, making Liaodong Bay an aquaculture center and the coastal areas of the Liaodong Peninsula, the Liaohe Delta and the Liaoxi corridor a major export production center.

This program will make the coasts of Liaoning Province a base to promote the province's efforts to open to the outside world and invigorate the economy in the interior of the province, which is underdeveloped economically, Lin Sheng said.

"We shall seek foreign partners and cooperate with other parts of the country," he said. "We shall also allow collectives and individuals to pool funds for developing the marine resources."

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CSO: 4010/1014

EXPERT CITES COMPUTER INDUSTRY ADVANCES

OW011948 Beijing XINHUA in English 1500 GMT 1 Apr 87

[Text] Beijing, 1 Apr (XINHUA)--China's computer industry is now capable of research, design, production and application, after decades of development, a leading Chinese computer scientist said here today.

Speaking at an international conference on computer application, Professor Guo Pingxin, chairman of the Science and Technology Committee of the Electronics Industry Ministry said, "Entering the 1980's, radical changes occured in China's computer production and application, and the direction of research work has changed from assembly and component parts to domestic manufacture."

Guo added, "China's practical use of computers has shifted from research, defense and a few key industries to popular use in all areas."

A rough survey last year showed the number of computers involved in research, production development and technical service were 250 [as received], operated and maintained by a staff of 100,000. The number of installed main-frame and mini-computers totalled 7,000, and micro-computers numbered 130,000, including the Chinese-made "Galaxy" super-computer.

"The focal point of China's computer industry has gradually shifted to microcomputers, and Chinese character information processing technology is now readily available," Guo said.

China began to develop its computer industry in 1956. At first China used computers in large scale projects, military and aerospace technology, and natural science research, such as the calculation of the orbits of the country's first man-made satellite, the design of early nuclear reactors, and the planning of large dams.

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CSO: 4010/1014

WUHAN UNIVERSITY DEVELOPS NEW COMPOUND MATERIAL

OW311411 Beijing XINHUA in English 1332 GMT 31 Mar 87

[Text] Beijing, 31 March (XINHUA)--A group of Chinese scientists have made an important breakthrough in developing a new material by mixing ceramics and metal, according to Professor Yuan Renzhang, president of Wuhan University of Technology, here today.

The university's Compound Material Laboratory, headed by Professor Yuan, has conceived new ideas and worked out new technology for the formation of non-metallic and metal-compound material over the past year. Now they have achieved valuable results in making such materials with high resistance to extremes of temperature wear and corrosion.

"It is hoped that our new materials will play important roles in the aeronautics, space technology, ocean shipping, machinery, chemicals, electricity, and transportation industries," Yuan said.

"We're attempting to put the strong points of the two kinds of completely different materials together chemically, which is expected to bring a revolutionary change to materials science and give a big push to many industries," Yuan added.

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CSO: 4010/2017

MEI SCIENTISTS REPRODUCE SUPERCONDUCTOR TUNNEL EFFECT

OW031451 Beijing XINHUA in English 1307 GMT 3 Apr 87

[Text] Beijing, 3 April (XINHUA)--Chinese scientists have reproduced what they call the superconductor tunnel effect which occurs between a layer of oxide-coated and a common piece of metal when both are cooled to a temperature of minus 195 degrees.

The achievement, made by the No. 16 Research Institute affiliated to the Ministry of Electronics Industry, shows China has become one of the few advanced countries in the research of high temperature superconductors.

The effect is also called the Josephson effect after its discoverer, British physicist Brian D. Josephson who found the property in 1962.

The test showed a flow of electric current between two pieces of superconducting material separated by a thin layer of insulating material when they are not connected to batteries.

Based on the principle of this effect, scientists produced many super-sensitive electronic devices applied in military, telecommunication, computer, medical and other fields over the past 2 decades.

During their tests, the Chinese scientists have recorded the special diagram of direct current which is as high as dozens of millivolts.

Previously superconductors would lose all electrical resistance only when cooled to absolute zero, which is 273 degrees c. The material used to cool the superconductors is usually made of expensive liquid helium.

But scientists from different countries have been attempting to develop superconductors able to work at higher temperatures which would allow them to use cheaper and more easily acquired liquid nitrogen.

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CSO: 4010/2017

PROGRESS DETAILED ON DOMESTIC PRODUCTION OF TV PARTS

Beijing DIANZI JISHU [ELECTRONICS SCIENCE & TECHNOLOGY] in Chinese Vol 16, No 10, 10 Oct 86 pp 5-7

[Article by Dong Yizhong [5516 6318 0022], Mo Kangcheng [5459 1660 2052], and Zhang Xi [1728 2569], Beijing Municipal Broadcast and Television Industrial Corporation: "The Demands Made on National Production of Components by Color Television"]

[Text] In recent years, there has been rapid development of domestic color television receivers, but the majority are assembled from separately imported components, which expends a great deal of foreign exchange. For example, components for each 14" television set cost more than $50, which does not even include the components used in the electronic tuner and the flyback transformer. To carry out the principle of self-relience and to save foreign exchange, we must earnestly put into effect the nationalization of color televisions. To this end, this paper brings together and explains briefly the demands made on components by the imported Matsushita televisions.

I. The Components Used in Color Television Are High in Quality

This is due primarily to the following three reasons:

1. There Is a High Starting Point

From its inception, the development of color television in this country has been established on the basis of importing and assembling discrete components, unlike the situation regarding black and white televisions, where we designed it ourselves. Because we are importing advanced foreign technology, the quality of color television is high, actual MTBF (mean time between failures) test results have reached 60,000 hours and more, and even just acceptable standards are 15,000 hours and more. MTBF for domestic black and white television, however, is currently only about 5-8,000 hours. Relatively speaking, the rate of return for repairs is quite low for color television, and the public is more satisfied.

Our efforts at the nationalization of color television begin from this starting point, so there is a great degree of difficulty. The components that can be used in black and white sets cannot be used in color sets. Also, color

television is a top-end consumer product with a price of 1,000 yuan and more, so the public is quite concerned about quality. After color television has used domestically producted components, we must for the most part attain the standard of the original model. Obviously, the quality of color television is directly related to the quality of the components used, and if we are to ensure the high quality of color television, we must have high quality components.

2. There Are More Components Used in Color Televisions

There are about twice an many components used in color television as in black and white sets. There is an inverse proportion of the MTBF of the entire set and the of the components (here, is the number of components in the entire set and is the failure rate of components). The greater is, the smaller is the MTBF of the entire set. Because there are more components used in color televisions, to maintain a certain MTBF, the failure rate of components must be quite low.

3. We Must Adapt To the Modes of Large-Scale Production

At present, color television sets are manufactured in large scale by a mechanized flow process, where if calculations are based on 500 units per shift, there will be more than 250,000 components and assemblies on the assembly line each day. If only a small number of components develop problems, this will affect the normal flow process. Therefore, very strict requirements have been proposed for the structural dimensions, solderability, and on-site failure rate to maintain normal production.

II. The particular requirements for component quality in color television

Currently prescribed new national (ministry) standards (or draft) for components are based upon IEC standards, which are a great improvement over standards of the past, but which cannot completely satisfy the requirements of color television. Pertinent conditions are now described.

1. The Performance Indicies for Certain Components Are Higher Than International Standards Currently in Use

	:color :requirements	:national :standards	(ministry) (or draft)
carbon film resistance temperature coefficient (10^{-6})	-300 ~ 700	-400 ~ 1000	
ceramic capacitor loss tangent (10^{-4})	10	15	

aluminum electrolytic capacitor loss tangent	0.1	0.15
polyester membrane capacitor dielectric resistance (MΩ)	40,000	30,000

2. High AQL (Acceptable Quality Level)

Color television is manufactured entirely through large scale flow process production. If there are quality problems with the components used during the assembly process, then it is especially troublesome when in the final debugging process you want to find the reasons why the quality of a component is not good and you want to remove any problems.

There is an index for throughput rate when checking overall the normal production conditions for the flow process:

$$\text{throughput rate} = \frac{\text{number of acceptable sets without any repair}}{\text{number of sets of discrete parts put into production}}$$

For color television assembled from imported discrete components, the throughput rate must be 95 percent. Consider this in regard to the actual level at present of domestic components, which the Ministry of Electronics permits to drop to 90 percent. Aside from having to do with set assembly techniques, the throughput rate is also closely related to the rate of unacceptability of components in the set. To guarantee a high rate of throughput for assembled sets, when the assembling plant is receiving components, AQL should be higher than national (ministry) standards. The AQL for components at the national (ministry) standard is generally from 0.5 to 1 percent, while color television requires an AQL higher than 0.1 percent.

3. High Reliability

The reliability of color television is indicated by its MTBF, the value for which is determined by the design, techniques, and failure rates of the components used. At present, domestic color television is all imported, and the designs have already been tested. According to material in a book by the Bureau of Management of the broadcast television industry, "Conclusions Regarding Components and Devices Used in Color Television," the failure rate because of technique is 30 percent the overall rate of failure, while the failure rate of components is 70 percent. Calculating on the basis of the 15,000 hour MTBF for color television, the average rate of failure for any component is approximately 100 Fit. This is the result from failure rate, but based on experience, when the assembled set is under reduced usage, the failure rate from usage is from 1 to 2 grades less than the fixed failure rate. Therefore, when the average fixed rate of failure for components is 1,000 Fit, that is, a grade six level, this is a grade improvement over the quality level for components under general manual operations.

4. High Stability

Color television is a top-end consumer product, and after customers buy it they hope that it will have a long life. During the period of use, it should not only not fail, but should also maintain a clear picture and high quality sound. This requires that under conditions of long use in all kinds of environments, the performance of components used in color television not change, or that the scope of such changes be very small. For example, metallic membrane resistance in Matsushita color televisions is highly stable throughout. It is required that for 2,000 hours at operating voltages at 70°C, resistance values can only change ± 1.5 percent, while tolerance for resistance value changes is ± 2 when left for 1,000 hours under no-loan conditions at 70°C in the national (ministry) standard (draft).

The index of stability for aluminum electrolytic capacitors and carbon film resistors are to varying degress higher than national standards (draft), a primary comparison of which would be as follows:

	Matsushita	national standard (draft)
carbon film resistance	40°C, 95% RH. 1,000 hours $\Delta R/R \leq \pm 2\sim 5\%$	40°C, 95% RH. 500 hours $\Delta R/R \leq 5\%$
aluminum electrolytic capacitor	40°C, 95% RH. working voltage for 500 hours $\Delta C/C \leq \pm 20\%$	40°C, 95% RH. no-load for 240 hours $\Delta C/C \leq \pm 20\%$

5. Good Adaptability to Techniques for Assembling Sets

The components of assembled sets should not only have excellent performance and reliable stability, but the adaptability of techniques should also be good. The demands by assembled sets on component techniques are generally apparent in the lead wires, one being the solderability of the lead wires, and a second being the material quality of the lead wires and their formed shape and dimensions. Problem solving regarding the former problem has already achieved certain results, and the effects of solderability on assembled sets has been understood. But the latter problem has not yet received enough attention.

Because assembling the sets is large scale flow process production, if the distances between leads are not uniform, during manual insertion this will affect efficiency, and for automatic insertion the requirements are even stricter, the allowance being only ±0.5 mm. Exceeding this value makes it impossible to insert. Aside from this, after component insertion into printed circuit boards, what is sent along the assembly line is in motion. To prevent the loss of components through oscillation, some assembled sets will require that the component leads be shaped, and that they be self-locking. There are at present some components that because their leads are too soft, their distances are not uniform and the shape and dimensions do not fit the requirements. When assembling the set, they are easy to lose, which can lead to a great deal of reworking and which seriously affects the throughput rate

of assembled sets. For this reason, although the performance of components might be good, if the problem with leads cannot be completely solved, the assembled sets will still not be usable.

To make leads fit requirements, abroad they use a harder CP wire on aluminum electrolytic capacitors and thin-film capacitors, and on ceramic capacitors they then use the harder ⌀0.6 copper leads. But domestically, the ministry standard has been set at ⌀0.5. Because the diameter is thinner, and also because the copper lead is softer, the lead is easily bent and cannot satisfy the requirements of the assembled set.

Aside from this, there are still two other points to meet the requirements of color television techniques: one is the problem of coded bands. Currently, some assembly factories have already imported automatic insertion machinery and need to be provided with component coded bands. The other problem is that packaging must be consistent with large scale production. If a domestic loudspeaker is first assembled into a small box, then put into a larger one, it becomes very inconvenient for the assembling factory to take it out.

6. Good Safety

Heat is generated within a color television cabinet, and in the summertime temperatures at certain locations within the cabinet can reach 70~80° C. Therefore, it is required that certain hot components and those components placed near high temperature locations (such as high voltage containers) be non-combustible to ensure the safety of the circuits.

There should also be some safety decisions about some high voltage components. As for example the high voltage ceramic capacitors used on antenna end-boards, which are there to prevent the 220 V at the bottom from entering the television antenna and to ensure personal safety. This must therefore be absolutely reliable, allowing no destructive loss of effectiveness.

There is also the need for explosion prevention for the aluminum electrolytic capacitors.

7. Good Uniformity

The uniformity of component performance depends upon the level of production techniques. Products of poor uniformity will reflect the instability of techniques, lack of strictness in quality control, and will cause later problems in debugging of the assembled set. Although at present there are no particular standards for the uniformity in color television for components, component factories cannot only satisfy the qualifications of product performance parameters.

For components produced on new imported conveyor systems the uniformity is more assured, but for the greater number of manually operated production lines uniformity is difficult to guarantee because of the greater influence of the human factor. Therefore, there should be a technology transformation of key processes, and mechanization and automation should be put into effect. There

should at the same time be a strict implementation of quality control and internal control standards should be set to reduce as much as possible the range of oscillation. To monitor the uniformity of component quality control, comparison charts of average values and variances should be produced for the major performance of each batch of products, as well as to provide a scientific basis for the improvement of the uniformity of products and make easier the adoption of measures for advancement.

The requirements discussed above of components by color television are general ones. Actually, as the characteristics of components themselves differ from the locations in which they are placed, particular requirements will differ.

III. Nationalization of Color Television Should Implement the Principle of Standardization

Because domestic assembly plants primarily import and assemble discrete components from Japanese factories (Matsushita, Sanyo, Hitachi, Sony, Toshiba, and JVC), and each Japanese factory will have its own requirements for the components, if in the process of nationalization each assembling factory just copies what the Japanese factory has done, that will lead to the formation of various requirements for the same product, which will bring confusion to manufacturing and technology management.

The components provided from abroad for use in our color televisions each differ from each other, and some are not even advanced. For example, the sound surface wave filter used in the Matsushita set is composed of zinc oxide and is perpendicular, while internationally they are generally of lithium niobate and are circular. Or again, the potentiometer of the pre-selector, where in the 14" Matsushita and Hitachi models currently manufactured in large quantities domestically a single potentiometer is used, while abroad they generally use a combination 8-position or 12-position potentiometer. Based on this situation, in the efforts to nationalize color television, we must implement a policy of standardization. All general use components should be for the most part in accordance with the new national (ministry) standards, and we should combine the requirements of components for color television to formulate uniform technical standards for the use of components by color television. We should take advancement and university into consideration and should unify as much as possible that which can be unified to hasten the progress of nationalization of color television.

IV. Nationalization can be expected to gradually satisfy the requirements of color television

Although color television makes very high demands on components, they are certainly not high beyond attainment. We have imported a group of component production lines and have carried out advanced management methods such as full quality control, and have now had more than 30 years experience in component development and manufacture. For these reasons, it is possible that we can gradually satisfy the demands of color television on component quality.

Recently, the Beijing Television Plant has undertaken small and medium scale trial assembly into color televisions of domestically made ceramic capacitors, thin-film capacitors, metallic thin-film capacitors, aluminum electrolytic potentiometers, switches, and inductors, as well as various transformers. Some of these components have been made on imported production lines, and some have been develped by copying designs from foreign samples. We have used some of these color televisions assembled with nationally produced components, and after examination and testing, they have been certified as being in complete compliance with the performance standards for color television. We did 1,000 hours of high temperature, loaded testing on three groups of color television sets that differed in their extent of nationalization. The results of the testing were excellent, and all could meet the color television requirements. This proves that we are capable of producing high quality components that satisfy color television requirements. Naturally, this is only the beginning. If we are to change from the import of discrete components to completely nationally produced components, there is still much work to be done. For example, when some components have been mounted and tested and to some degree or other they have problmes, then we must resolve this; some components are at present only in the testing stage, and we must pursue the techniques of large production, develop specialized equipment, and establish production lines before this will constitute a production capacity; and existing production lines must better improve their levels of management and set up and perfect quality assurance systems.

In summary, the base of the nationalization of color television is in components, and we hope that our comrades in the component industries are preparing to strengthen, are grouping together policies and strength, and will gradually provide acceptable component products to make contributions to the nationalization of color television.

12586/13104
CSO: 4008/1010

BRIEFS

TRAINING OF MEDICAL PERSONNEL--Beijing, 6 Feb (XINHUA)--China provided on-the-job training to 2.8 million medical managerial personnel and technicians between 1981 and 1986, XINHUA learned today. All of the country's 900,000 junior medical technicians have received more training, and more than 1.3 million rural doctors and nurses are taking advanced courses if they received their basic training before 1983. China now boasts more than 20,000 adult medical education centers, including 44 medical colleges for managerial personnel and related workers, departments and night schools affiliated with general medical colleges, and specialty and vocational schools. Since 1981 China invested more than 200 million yuan (54 million U.S. dollars) to provide adequate training centers to upgrade the country's medical personnel. [Text] [Beijing XINHUA in English 0724 GMT 6 Feb 87] /9604

DOMESTIC MICROCOMPUTER MARKET--Beijing, 11 Feb (XINHUA)--China's domestic microcomputer market will grow this year, according to SHANGHAI ELECTRONICS INFORMATION. Central authorities and provinces have worked out a plan to update industries using microcomputers, and banks, information centers, statistical and educational institutions will continue to buy microcomputers. China plans to increase output by at least 30 percent this year, which is estimated to meet 80 percent of the demand. Large capacity models, able to calculate more than 2.5 million times per second, will also be developed. [Text] [Beijing XINHUA in English 1545 GMT 11 Feb 87] /9604

ELECTRONICS INDUSTRY TO FOCUS ON COMPUTERS--Beijing, 18 Mar (XINHUA)--China's electronics industry will focus on setting up several systems engineering projects, including computers and integrated circuits, over the next few years. Xie Gaojue, vice-minister of the country's electronics industry, made the announcement at a national meeting on electronic sciences which opened here today. "Technological development centers for these projects will be established to help upgrade China's existing electronic industry with imported technology," he said. The vice-minister, who is also in charge of the ministry's scientific and technological work, described the application and development of new electronic technology as a "strategic task" in accelerating the country's modernization drive. "Research institutes should cooperate with production sectors and universities to develop micro-electronic technology, computer science and software techniques and in the design and production of key products," he said. The industry now boasts 140 research institutes employing more than 100,000 scientists. [Text] [Beijing XINHUA in English 1110 GMT 18 Mar 87] /9604

RUSSIAN-CHINESE SCIENTIFIC DICTIONARY--The New Russian-Chinese Scientific and Technological Dictionary, compiled by Comrades Liu Xintang and Zhang Youhai, associate professors at the Xi'an Air Force Guiding Missile Institute, in their spare time, will soon be published by the Shaanxi People's Publishing House. This is China's first large-scale and comprehensive Russian-Chinese scientific and technological dictionary. This dictionary has over 100,000 entries and a total of about 3 million words, and deals with all existing branches of learning. According to experts, this dictionary can meet the needs of the vast numbers of scientific and technical workers and teachers and students of universities and colleges. [Text] [Xian Shaanxi Provincial Service in Mandarin 0030 GMT 30 Mar 87 HK] /12232

SUPERCONDUCTOR FILM PRODUCED--Beijing, 31 March (XINHUA)--Beijing University researchers have developed a superconductive film which offers almost no resistance to electric current when cooled to a temperature of minus 213 degrees centigrade. Its resistance to electricity begins to drop sharply when the film, varying from 0.5 micron to 1 micron in thickness, is placed at a temperature of minus 183 degrees c. The achievement is another major breakthrough in promoting the application of superconductors in electrical components, and the material is very significant to the development of high precision magnetic measureing instruments and high powered computers. The university is attempting to make new superconductors capable of working in liquid nitrogen at minus 196 degrees centigrade. At this temperature, the coolant could be obtained with cheaper and more easily acquired liquid nitrogen. [Text] [Beijing XINHUA in English 0730 GMT 31 Mar 87 OW] /12232

CSO: 4010/2017

DESIGNING CAP-14 CROSS SIMULATOR SOFTWARE

Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TONGJI UNIVERSITY] in Chinese Vol 14, No 3, Sep 86 pp 397 - 406

[Article by Su Mengjin [5685 1322 2516] of the department of Electrical Engineering: "Design of CAP-14 Cross Simulating Tool"; manuscript received on 14 Oct 1985]

[Text] Abstract: Simulation and emulation of different computers has always been one of the important subjects in computer science. In this paper, using APPLE-II CP/M as the environment, the cross simulation of the CAP-14 computer is introduced.

1. Introduction

In May 1985, the first "Computer Software Personnel Examination" (programmer level) was held in Shanghai. According to the guideline formulated by the test committee, programmers must have design and analysis capabilities with languages such as FORTRAN, PASCAL and CAP-14. CAP-14 is defined as the assembler used on a COMP-14 computer. The "CAP-14 Cross Simulator" software discussed in this paper is designed to simulate the operation and program design on a COMP-14 computer in the APPLE/II CP/M environment. It is offered as a resource to learn and to further analyze and investigate the CAP-14 language.

2. Composition of the CAP-14 Cross Simulator Software

The cross simulator software includes the following three software programs added to the CP/M operating system:

(1) the CAP-14 Cross Assembler program CASM (approximately 4 kB);

(2) the CAP-14 Linker program CLINK (approximately 5 kB);

(3) the CAP-14 Simulator program CSIMUL (approximately 2 kB).

Under the support of the CP/M operating system and its peripherals, these three programs accomplish the cross assembling, linking and simulating CAP-14 source programs. The cross simulation process is shown in Figure 1. These

three command files (CASM.COM, CLINK.COM and CSIMUL.COM) are system files resident on the system disk. They become new user system commands.

3. The COMP-14 Computer and CAP-14 Assembly Language

The COMP-14 is a 16 bit byte addressable virtual computer. As far as a user is concerned, a COMP-14 computer has 6 registers and a flag, as shown in Figure 2 where

PC - Program Counter

BR - Base-address Register

GR_0 - GR_3 - General Purpose Register

C - Condition Flag

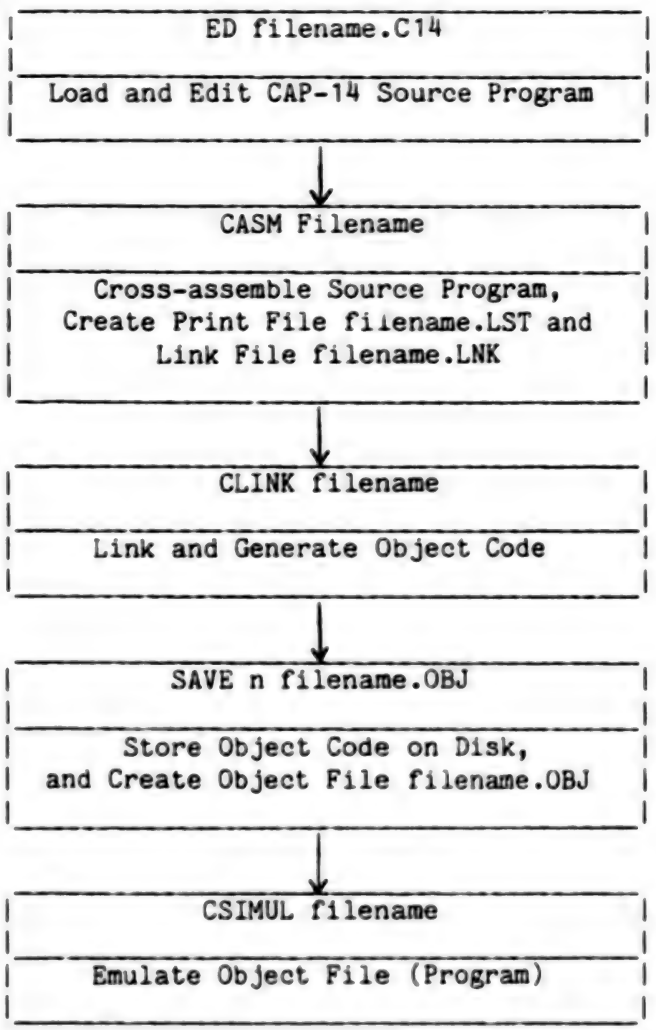


Figure 1. Cross Simulating Procedure of the CAP-14 Assembly Language

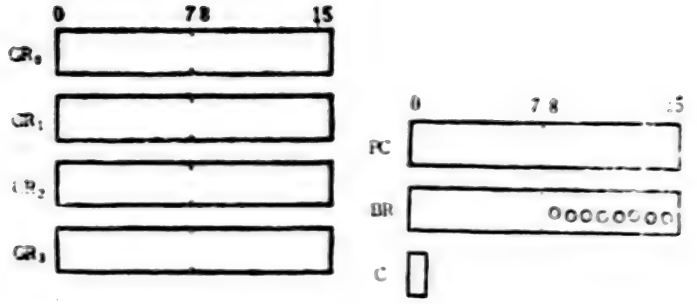


Figure 2

The length of each storage element of the CAP-14 computer is 16 bits. Each storage block consists of 256 elements. The addressable range is 0000 - $FFFF_{(16)}$. The total internal storage capacity is 65536 words, i.e. 131072 bytes.

There are 14 commands in the CAP-14 instruction system. Their functions and symbols are shown in Table 1. Each command occupies one internal storage unit (16 bits) and its binary format is shown in Figure 3.

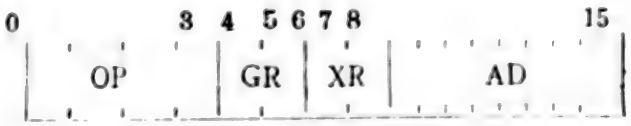


Figure 3. Binary Format of a CAP-14 Instruction

Instructions are divided into four sectors from the highest to the lowest bit:

OP sector (0 - 3 bits): instruction operation code. Except for 0111 and 1001, they correspond to the 14 instructions (see Table 1);

GR sector (4 - 5 bits): general register number;

XR sector (6 - 7 bits): indexable register number. Address unchanged when XR=00.

AD sector (8 - 15 bits): address sector. The lower 8 bits of the effective address of the operand is created by adding the address sector to the lower 8 bits of the indexable register (dropping the carry over digit).

Table 1 The COMP-14 Instruction System

CAP-14 symbol	operation code	meaning
HJ	0000	shut down and restart
JNZ	0001	non-zero swap
JC	0010	conditional swap
JSR	0011	return
SFT	0100	shift
IN	0101	input
OUT	0110	output
LAI	1000	fetch valid address E
ADD	1010	add
SUB	1011	subtract
LDA	1100	access data
STA	1101	send data
AND	1110	logic function "and"
EOR	1111	logic function "or"

In addition to these 14 instructions, CAP-14 also defined five pseudo-instructions. The pseudo-instructions and regular instructions should be written and entered into the computer according to the format specified in Table 2.

In the address code column in Table 2:

d - a decimal number;

n - a decimal number or symbol;

h - a hexadecimal number;

g - a general register number (0 - 3);

x - an indexable register number (0 -3).

The valid address of an instruction operand can be generated according to the following expression:

$$E = \begin{cases} n + BR & x = 0 \\ [\, n + GR_x \,] \bmod 256 + BR & x \neq 0 \end{cases}$$

where BR is the base register (its lower 8 bits are always 0). CAP-14 does not specify comments on the instructions. Let us fill it in here. The comment begins after a colon ":" in an instruction statement in the source program.

Table 2 Format of CAP-14 Instructions

symbol	operation code	address code (operand)	
a	START	d	define program address
	END	n	terminate program
a	RESV	d	reserve storage unit
a	CONST	h	define constant unit
a	ADCON	n	program link address
a	op-code	g, n, x	regular instructions

4. The CAP-14 Cross Assembly Program - CASM

The cross assembly program CASM employs a double scan method. In the first scanning process, a table of symbols is established. In the second scan, codes are converted and linkers are processed. Figure 4 shows the flow chart of CASM.

In the process of scanning through the source file filename.C14, CASM checks and processes the label column of each instruction statement. When a label is found, its legality is checked (to see whether the definition is repeated or the spelling is wrong). Afterward, the label and its corresponding address counter value are entered into the rear of the LABEL TABLE. The pointer at the rear of the table is pushed backward. Each element of the label table takes up 5 bytes. The first three bytes store the ASCII code of the label (when the label requires less than 3 bytes, fill in the label for space SP). The last two bytes are used to store the address. For example, the address of the label "PRG" is 013E, then the way it is filled out in label table is shown in Figure 5.

In order to ascertain the address of the label, the first scan also processes the operand portion of the pseudo-instruction such as START or RESV and adjusts the address counter. There is no doubt that the first non-empty statement (instruction) must be the START command. The first scan also establishes a SEGMENT TABLE to sequentially record the initial address and length of each program segment as defined and divided by a START command. Obviously, the segment table is formed after the first scan.

The second scan sequentially transforms each mnemonic instruction in the source program into the COMP-14 machine instruction format and error prompting. In addition, it creates to files in different formats:

(1) list file (filename.LST), in ASCII code;

(2) link file (filename.LNK), in binary code.

filename.LST is an assembling inventory. The file is sent to the output by the page (as printed) at 58 lines/page. It is divided into four sections columnwise: address segment, object code segment, line number segment and source program statement segment. CASM classifies the syntax errors in the source program into two categories - assemblable and unassemblable. There are six assembly errors:

(1) ILLEGAL LABEL

(2) LABEL MULTIPLE DEFINITION

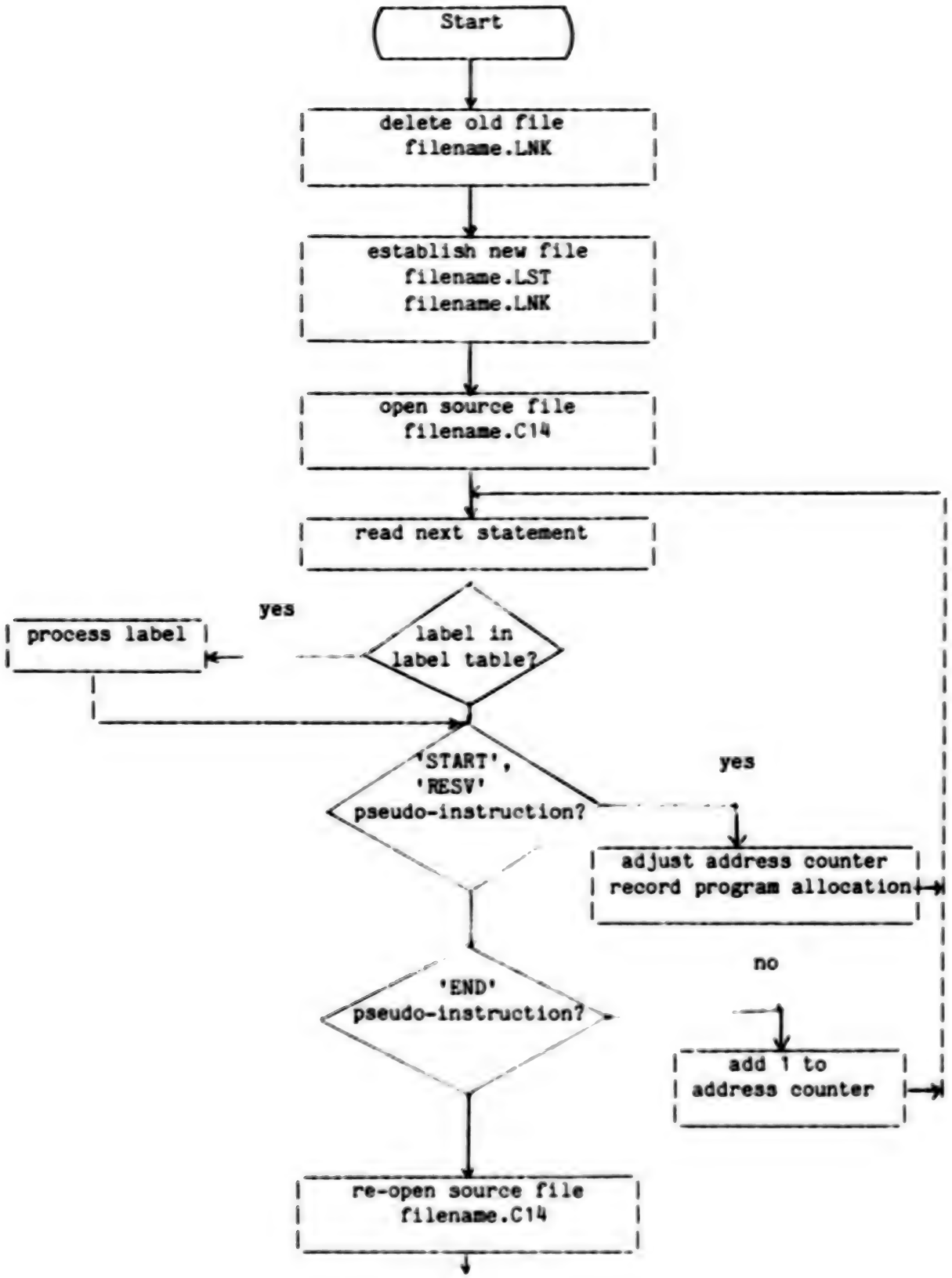
(3) OPERAND ERROR

(4) ILLEGAL OPCODE

(5) OVER RANGE

(6) LABEL NOT FOUND

The above error messages are created in the second scan. They are attached to the error statements and written in the filename.LST file. The unassemblable errors are the fatal ones which cause the assembling process to stop. For instance, the START command is not used as the first non-empty instrument in the source program (failure to allocate and ascertain the program and label address). Once this type of error is encountered, the assembly process is ceased immediately without any results.


Start
delete old file
filename.LNK
establish new file
filename.LST
filename.LNK
open source file
filename.C14
read next statement
label in
label table?
yes
process label
'START',
'RESV'
pseudo-instruction?
yes
adjust address counter
record program allocation
'END'
pseudo-instruction?
no
add 1 to
address counter
re-open source file
filename.C14

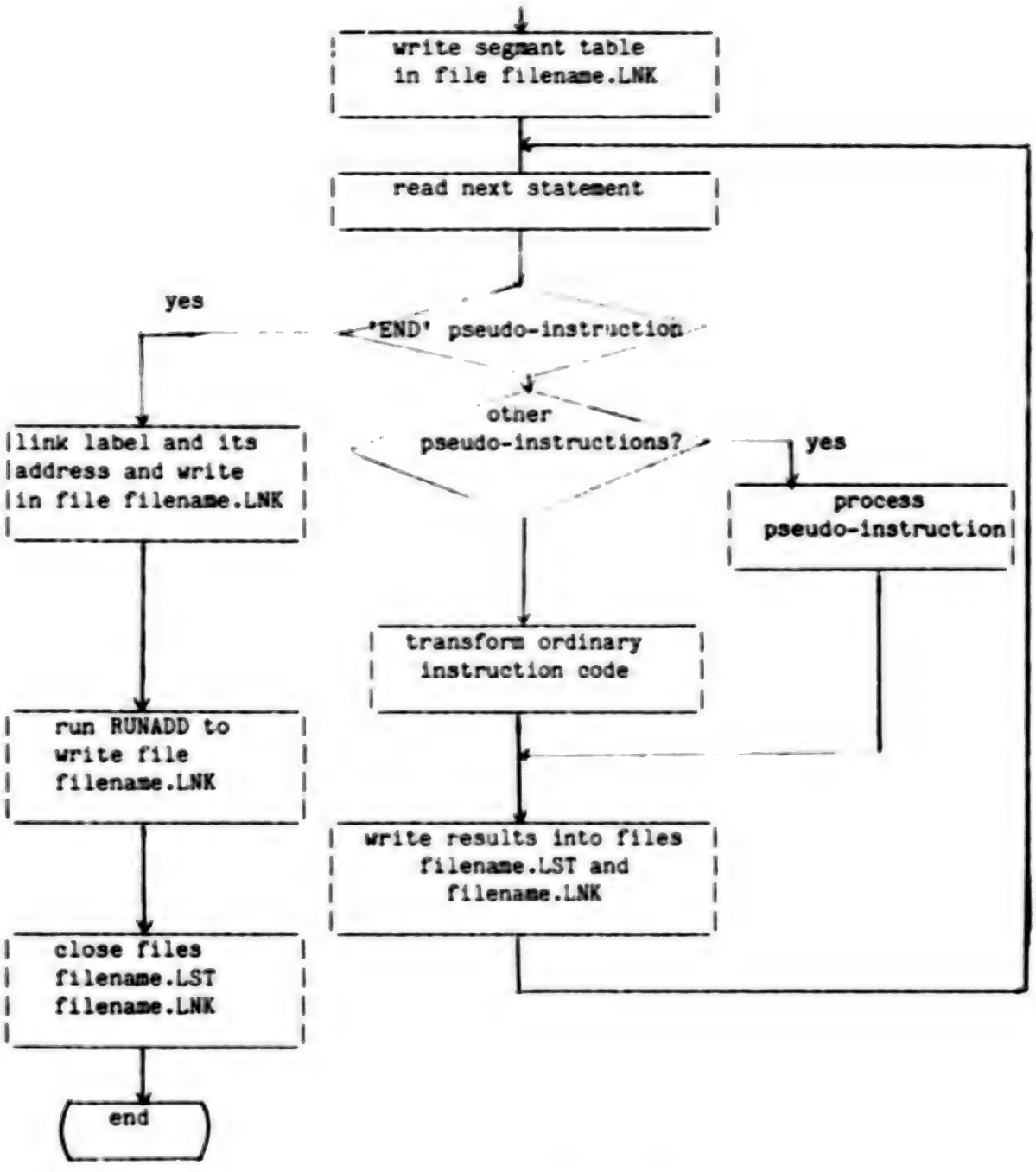


Figure 4. The CASM Flowchart

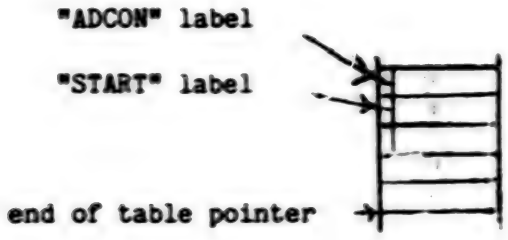


Figure 5. Structure of the Label Table

The CAP-14 assembler operates in such a way which allows the independent assembly of program modules and the linkage of the entire program. A program can be divided into several modules to be edited and assembled individually. Finally, it is linked into one program. Therefore, the link file filename.LNK must provide the necessary linkage message. In order to link the modules, the filename.LNK file preserves the START pseudo-instruction column in the source program and the un-defined label and its address in the pseudo-instruction column of ADCON. After CASM completed two scans, all label tables are created. The two kinds of labels mentioned above are tabulated according to the format shown in Figure 5. These two labels are used as the linking message and are included in the filename.LNK file. The end of the file is the starting address of the program module RUNADD.

5. The Linker CLINK

The file filename.LNK includes the instruction codes and their load addresses of the program segments. It is necessary to project these codes onto the COMP-14 address space (simulation space). In addition, the program modules are called through linking. Based on the segment table in the file filename.LNK, the linker sequentially projects the instruction code in each segment to the storage space of COMP-14. Furthermore, it searches and processes each link label individually. After the linking is completed, the final operable (simulation) code (program) can be created in the internal memory of the computer (host computer). Each program segment and module can overlap in the address space. However, CLINK does not provide any prompting. The overlay is automatically done. The overlay relation is determined by the way the source program is written and the linking sequence. The latter overlays the former (the program linked last has the highest priority in program segment overlay). It is controlled by the user in program assembly and linkage.

CLINK checks the following situations in the linking process and provides prompting and treatment.

(1) It displays the un-processed ADCON pseudo-instruction address column label on the monitor to prompt the user for the next link operation.

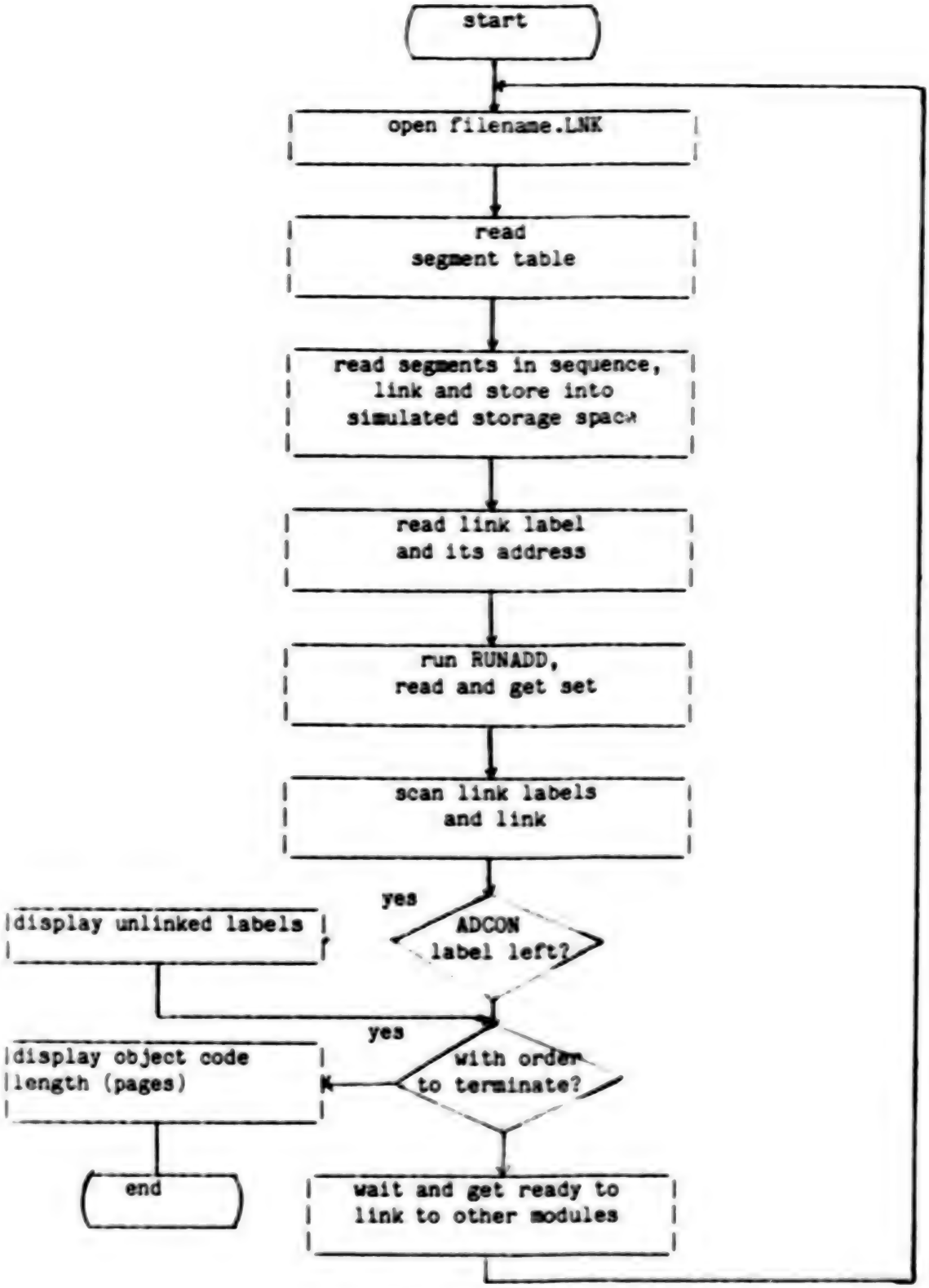


Figure 6. The CLINK Flowchart

(2) Upon receiving the "/" command from the user to terminate the operation, if the actuating address is not obtained, the program will prompt the user so.

(3) When the same label name is found in two modules, it will issue an alarm and stop the linking process.

6. The Simulation Program CSIMUL

Under the support of the APPLE II CP/M operating system, CSIMUL analyzes the COMP-14 instructions one by one and runs the COMP-14 instruction program in simulation. It creates a virtual COMP-14 environment for the user by software.

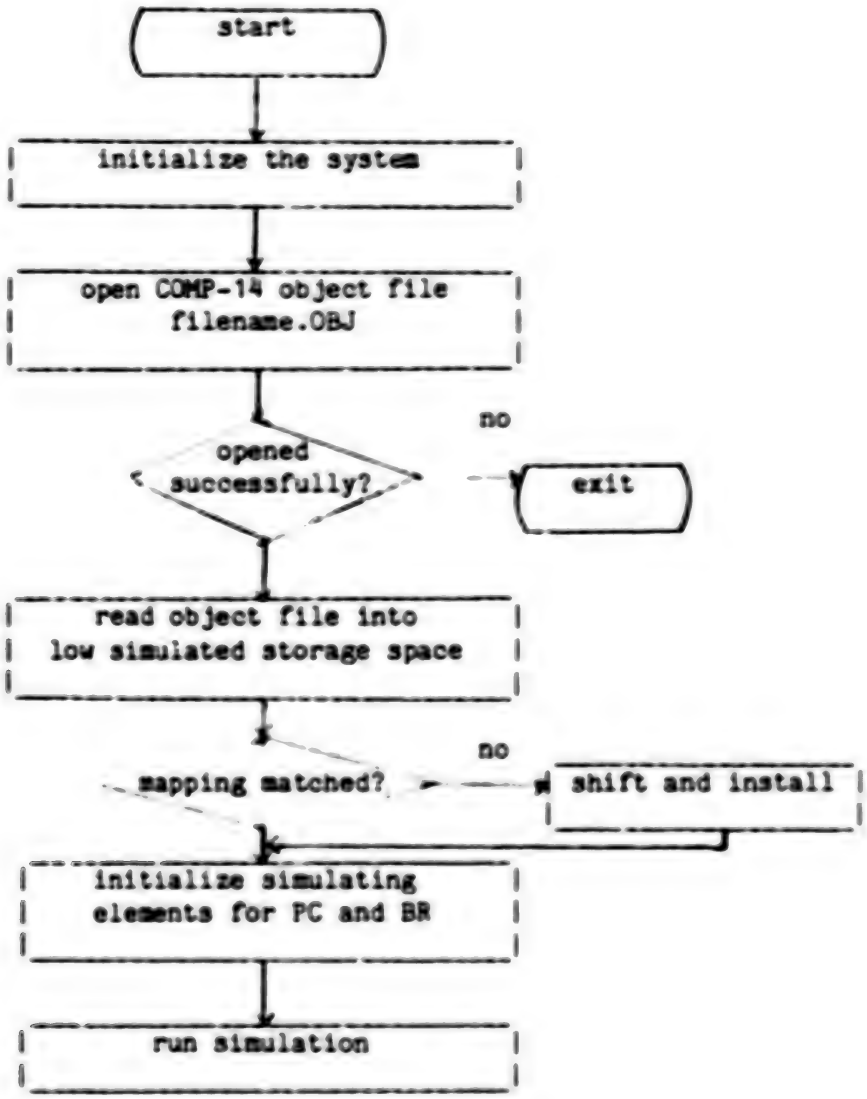


Figure 7. The CSIMUL Flowchart

CSIMUL sets up two simulating spaces in the internal memory of the APPLE II computer:

(1) Register Simulating Space. Various COMP-14 registers (PC, BR, GR_0 - GR_3, C) are simulated by several storage elements (bytes). PC and GR_0 - GR_3 occupy two neighboring storage elements. The lower 8 bits of BR are always 0. Therefore, it only takes up one element. The labeller C also only occupies one element. In addition, a two-byte storage element is set up as the COMP-14 command register (nigh byte OPCODE, low byte AD).

(2) Simulated COMP-14 Register Space. CSIMUL establishes a chunk of storage elements in the internal memory of the APPLE-II as the simulated COMP-14 register space. The initial address of the simulated register is BASE which corresponds to the 0 storage element of the COMP-14 computer. Each byte of the storage element in the COMP-14 computer is 16 bits long, which corresponds to two neighboring bytes (low byte in front) on the APPLE-II. The mapping relation between the APPLE-II CP/M storage address Az_{80} and the COMP-14 address Ac_{14} is:

$$Az_{80} = BASE + 2*Ac_{14}$$

$$Ac_{14} = (Az_{80} - BASE)/2$$

After assembling and linking, the CAP-14 assembly language source program is finally converted into an object code file filename.OBJ to be stored on disk. It runs under the support of CSIMUL.

The flowchart for the program CSIMUL is shown in Figure 7. After the object code file is read into the internal memory of the APPLE-II, it is installed into the simulated COMP-14 register space according to the mapping relation. Based on the actuating address, it begins to initialize the simulated elements for Pc and BR. Finally, it runs the COMP-14 commands in simulation. The simulation always gets the COMP-14 instruction from the simulation storage address specified by PC. It is sent to the instruction register OPCODE and AD. We then add 1 to PC. The operation code of the instruction is analyzed judged and executed in the relevant sub-program in simulation. When a sub-program is finished, it returns to the fetch sub-program segment entrance (for the next instruction). The 14 COMP-14 commands can, of course, use the same number of sub-programs in one to one correspondence. However, consider the fact that some instructions (such as addition and subtraction) have a great deal of similarity, they can be consolidated. The block diagram of the simulation loop is shown in Figure 8.

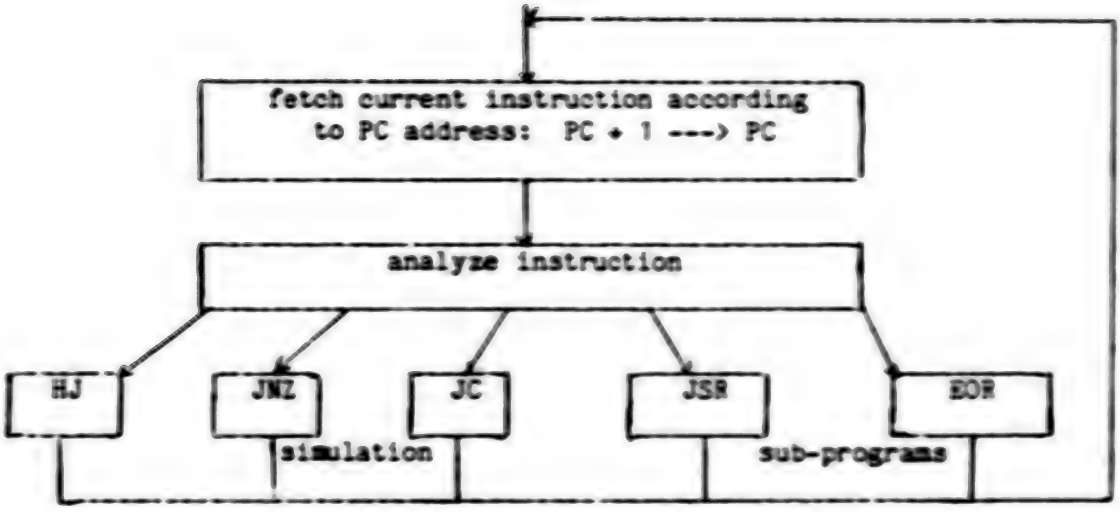


Figure 8. The Simulating Flowchart

7. Effect and Performance of the Simulation

The effect and performance of the simulation can be considered in two aspects; authenticity and efficiency. The authenticity of the simulation is understood as the similarity between the simulating environment provided by the host computer and the function of the prototype. In the APPLE-II CP/M environment, the system only has 56K (or 44K) bytes of memory (1K = 1024). Besides the overhead of the operating system and CSIMUL itself, it can only provide approximately 48K (or 40K) bytes of memory. This is quite different from the COMP-14 memory. Nevertheless, even with this much memory, it is already considerable for people who are learning the CAP-14 assembly language. Because the simulation process interprets and simulates each COMP-14 instruction and installs the simulation space, functionally it is very realistic. Except for the fact that the memory is limited by the hardware (such a limit does not exist if a higher level of microcomputer such as the IBM-PC is used as the host computer), the user can realize all allowable COMP-14 operations on an APPLE-II CP/M, including dynamically editing the running program itself. The experiments conducted showed that the results are satisfactory.

The simulation efficiency is the simulating speed, which is also a major problem of concern. The simulation discussed above is analogous to an interpretive implementation process. Every COMP-14 instruction is simulated by implementing dozens and even hundreds of Z-80 instructions. Therefore, the simulation speed is not at the same level as that of the Z-80. However, because the COMP-14 is only an imaginary computer, the system clock and instruction cycle have no real definition. The simulation efficiency cannot be evaluated objectively. We can only use our feeling as a guideline. Our experience shows that the simulation is completed instantaneously for shorter programs.

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12553
CSO:4008/1009

ON SLOSHING OF LIQUID IN PARTIALLY FILLED RECTANGULAR TANK UNDER LOW-GRAVITY CONDITIONS

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 1-9

[English abstract of article by Wang Zhaolin [3769 3564 2651], et al., of the Department of Engineering Mechanics]

[Text] The static surface shape of liquid in a two-dimensional rectangular tank under sub-gravity conditions was determined by the Runge-Kutta method, the evolution of the basic frequency of the sloshing liquid was studied by expansion of the Fourier Series, and the results are compared with those reported by others. (Paper received July 1985.)

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CSO: 4009/1077

NEW WEIGHTED TECHNIQUE IN HEURISTIC SEARCH

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 10-17

[English abstract of article by Zhang Bo [1728 6876] of the Department of Computer Science and Technology, Qinghua University; Zhang Ling [1728 6875] of the Department of Mathematics, Anqing Pedagogical College]

[Text] A new weighted technique is incorporated in A (or A*) search which results in a new algorithm--WSA. It is known from previous work by the authors that heuristic search can be considered a random sampling process. Based on some statistic inference methods, the probability that a subtree in the search tree contains the goal can thus be estimated. Some weight can be added to the nodes which are unlikely to be in the solution path so that the search will focus on the most promising path. In a uniform m-ary tree, the authors show that the new weighted method can improve the search efficiency significantly. (Paper received May 1985.)

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CSO: 4009/1077

ELASTIC-PLASTIC FINITE ELEMENT ANALYSIS FOR STIFFENED TENSION PLATE WITH ECCENTRIC CRACK

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 18-29

[English abstract of article by Luo Xuefu [5012 1331 1381] of the Department of Engineering Mechanics]

[Text] A finite element method which is a variable stiffness method combined with the initial stress method is developed based on the theory of plastic deformation. The method is used in the analysis of the elastic-plastic crack tip field of cracked tension plates with or without edge stiffeners. The effects of stiffeners on the elastic-plastic fracture of cracked plates are analyzed. The validity of the results of linear elastic fracture analysis, when the plastic region exists, is discussed. (Paper received July 1985.)

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CSO: 4009/1077

ANALYSIS OF FLASHOVER CRITERION OF POLLUTED INSULATOR UNDER AC VOLTAGE

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 30-39

[English abstract of article by Guan Zhicheng [7070 1807 2052], et al., of the Department of Electrical Engineering]

[Text] The AC arc on a pollution surface alternates in strength during each cycle and even extinguishes and reignites while the current passes through zero. It is proposed that the most important factor in determining the AC flashover criterion is the recovery condition, not the reignition condition as proposed by others. The recovery conditions of the AC arc on the pollution surface are theoretically analyzed and checked by tests. The mathematical model for calculating the AC flashover criterion of polluted insulators is presented. The calculated results are in agreement with the experimental data. (Paper received February 1985.)

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CSO: 4009/1077

CONSTITUTIVE MODEL FOR COMPLEX LOADING AND INTEGRATION OF ITS EQUATIONS

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 40-50

[English abstract of article by Xie Yihuan [6200 0001 3883], et al., of the Department of Engineering Mechanics]

[Text] A new constitutive model based on a combination of the Dafalias model and a generalized Hodge model, suitable for complex loading and especially for cyclic loading, is presented. The method of approximate analytical integration for this model is given. The examples show that the model possesses the capability of describing the characteristic response of materials to the cyclic loading. The model has the advantage of being coupled conveniently into the existing finite element programs which serve for general purposes and not requiring too much computer storage or computing time. (Paper received May 1985.)

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CSO: 4009/1077

STUDY AND APPLICATION OF SLIP LINE METHOD

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 95-103

[English abstract of article by Jiang Fanghui [5592 2455 6540], et al., of the Department of Engineering Mechanics]

[Text] In many plastic deformation cases the velocity field is rather easily solved by an analytical method. It is therefore not difficult to obtain analytically the slip line field by using the similarity between the slip line field and the velocity field. The load limit of the structure or technological processes can also be obtained. The proposed method is convenient for calculation and effective for improving precision. (Paper received May 1985.)

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CSO: 4009/1077

POST-PROCESSING PLOT CODE INETPL

Beijing QINGHUA DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF TSINGHUA UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 26 No 3, Jun 86 pp 104-110

[English abstract of article by Zhang Ruiyin [1728 3843 5419], et al., of the Institute of Nuclear Energy Technology]

[Text] A post-processing code INETPL, using the M150 computer at Qinghua University, is presented. The basic rules and methods for developing three-dimensional depictions, two-dimensional isograms and one-dimensional graphs of two-dimensional arrays are described. (Paper received March 1985.)

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9717
CSO: 4009/1077

SYNTHESIS OF cis-1,4-POLYBUTADIENE WITH NICKEL CATALYST. VII. INTERACTIONS BETWEEN TRIFLUORINATED BORON ETHYL ETHER COMPLEX AND ZERO-VALENCE NICKEL BY METHOD OF MAGNETIC SUSCEPTIBILITY

Lanzhou HECHENG XIANGJIAO GONGYE [SYNTHETIC RUBBER INDUSTRY] in Chinese Vol 9 No 5, Sep 86 pp 331-335

[English abstract of article by Chen Dianbao [7115 3329 1405], et al., of Qingdao Institute of Chemical Technology]

[Text] The interactions between $BF_3 \cdot OEt_2$ and zero-valence nickel, Ni(0), in the catalyst system $Ni(naph)_2$-$BE_3 \cdot OEt_2$-$Al(i\text{-}Bu)_3$(Ni-B-Al) and Ni-Bd-B-Al (butadiene abbreviated to Bd) were studied by the magnetic susceptibility method. The results show that in the three-component system Ni-B-Al, with a wide range of molar ratios of B/Ni from 0.0005 to 2, the aggregated colloid particles of Ni(0) exhibit the ferromagnetic signal, the value of which changes from the lower one to the higher one, and then reaches its maximum, then falls again until it disappears. The reaction of Ni(II) reducing to Ni(0) is improved due to the presence of B. In the four-component system Ni-Bd-B-Al, there is competition of Bd with B for Ni(0), implying that Bd destroys the aggregation of Ni(0), and resulting in the disappearance of the ferromagnetic signal. (Paper received 26 Sep 86.)

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CSO: 4009/1073

MECHANICAL PROPERTIES OF POLY(STYRENE-OXYPROPYLENE) MULTIBLOCK COPOLYMERS AND THEIR COMPATILIZING ACTION IN BLENDING

Lanxhou HECHENG XIANGJIAO GONGYE [SYNTHETIC RUBBER INDUSTRY] in Chinese Vol 9 No 5, Sep 86 pp 336-340

[English abstract of article by Chen Xin [7115 2450], et al., of Hubei Research Institute of Chemistry, Wuhan]

[Text] The dynamic mechanical properties and stress-strain behavior of poly (styrene-oxypropylene) multiblock copolymers and the compatilizing action in blending epichlorohydrin rubber and polystyrene have been studied. It is shown that these copolymers exhibit two T_gs (108°C and -47°C) and behave like thermoplastic elastomers at 20-30 percent polystyrene content and like resin at more than 40 percent polystyrene content. Tensile strength of the copolymer becomes higher and permanent set lower as the molecular weight of the polystyrene block exceeds 0.8×10^5. Addition of 2 percent of these copolymers to the blends of polystyrene and epichlorohydrin rubber improves their mechanical properties and causes their two T_gs to become closer. The main factors influencing the compatilizing effect are the total number and length of the blocks. The blends showing the optimum mechanical properties are composed of 30/70 to 40/60 weight ratio of polystyrene and epichlorohydrin rubber and 2 percent of the block copolymer with the same ratio of the polystyrene block and polyoxypropylene block and mixed at 155°C for 4-6 minutes. Their tensile strength approaches 15 MPa, elongation 500 percent and permanent set 6 percent. (Paper received 31 Mar 86.)

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9717
CSO: 4009/1073

INTRODUCTION TO CD-GT·CAD-1 INTERACTIVE COMPUTER AIDED DESIGN SYSTEM

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQING UNIVERSITY] in Chinese Vol 10 No 1, Jan 87 pp 10-19

[English abstract of article by Ren Guangsheng [0117 0342 0524], et al., of the Department of Mechanical Engineering]

[Text] Applying Group Technology (GT) to the product design field is of vital importance for carrying out the GT system in industry. Based on a combination of GT and CAD, an interactive CAD system named the CD-GT·CAD-1 system has been developed which allows users to design and draft wheel-disk type parts by selecting the number from the order list displayed on the screen.

The CD-GT·CAD-1 system is implemented on an IBM-PC/XT microcomputer supported by the CCBIOS 2.10 disk operating system and the Auto CAD-86 computer drafting software package. The words displayed on the screen and on the drawing are all in Chinese, making the system convenient for use in small and medium-sized manufacturing plants. The system is also suitable for computer design of other types of parts, such as gears, shafts, boxes, etc. As an example, the design of a part, together with the detailed procedure using the interactive system, is illustrated.

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CSO: 4009/1090

OPTIMIZATION DESIGN OF AUTOFRETTAGED THICK WALL CYLINDERS

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQING UNIVERSITY] in Chinese
Vol 10 No 1, Jan 87 pp 20-28

[English abstract of article by You Lihua [3266 3810 5478], et al., of the Department of Mechanical Engineering]

[Text] Solutions of elastic-plastic stresses and displacements in thick wall cylinders considering strain hardening of material are derived by means of the continuous stress-strain broken line. Then, the optimization design of autofrettaged thick wall cylinders is given with constraints that reverse yielding does not occur after the autofrettage pressure is released and the maximum equivalent stress caused by the working pressure is not greater than the allowable stress. (Paper received 21 Jan 86.)

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CSO: 4009/1090

NEW METHOD FOR CALCULATING BALANCER IN PARTIAL INERTIA FORCE BALANCING OF PLANAR LINKAGE MECHANISMS

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQING UNIVERSITY] in Chinese Vol 10 No 1, Jan 87 pp 35-41

[English abstract of article by Lu Zhongwen [0712 0112 2429] of the Department of Mechanical Engineering]

[Text] Based on the idea of curve fitting, a new method is presented for calculating the balancer in partial inertia force balancing of planar linkage mechanisms. From this method a simple formula is derived. This formula may be used to calculate the magnitude and trim angle of the balancer. As an example of using the formula, a typical problem of partial inertia force balancing in planar linkage mechanisms is analyzed and calculated. The calculated results are compared with those from other optimization methods; the new method is both simple and effective. (Paper received 21 Oct 85.)

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CSO: 4009/1090

FAST ALGORITHM OF RELIABILITY EVALUATION IN LARGE SCALE SYSTEMS BY DECOMPOSITION

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQING UNIVERSITY] in Chinese Vol 10 No 1, Jan 87 pp 51-58

[English abstract of article by Chen Hua [7115 5478], et al., of the Institute of Electrical Power Systems]

[Text] The equivalence by minimal cut sets in a network is frequently an important problem of reliability evaluation in large-scale systems, and it is also a main reason that there exists "dimension calamity." A fast algorithm by decomposition is proposed and the accuracy of the algorithm is proved. Because of using a linked list data structure and "depth first search" (DFS), it is efficient for determining the connection. A method for identifying whether a branch set is a minimal cut set is also proposed. It is evident that the algorithm is powerful from the analysis of the complexity of the computation and the numerical example of the network reliability evaluation. (Paper received 4 Jul 86.)

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CSO: 4009/1090

EFFECT OF GALLIUM IN PLAIN LOW CARBON STEELS

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQ[illegible] UNIVERSITY] in Chinese Vol 10 No 1, Jan 87 pp 69-78

[English abstract of article by He Zefu [0149 3419 4395], et al., of the Department of Metallurgy and Materials Engineering]

[Text] An investigation of the effect of 0.005-0.44 percent Ga on the microstructure and mechanical properties of plain low carbon steels show that a gallium solution in steel produces solid solution strengthening and toughening at low temperatures. The mode of wear and the cause of poor wearability with gallium is also discussed. (Paper received 17 Apr 86.)

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CSO: 4009/1090

STUDY OF SURFACE HARDENED IRON BASE POWDER METALLURGY PRODUCTS

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQING UNIVERSITY] in Chinese Vol 10 No 1, Jan 87 pp 84-99

[English abstract of article by Zhang Tingkai [1728 1694 2818], et al., of the Department of Metallurgy and Materials Engineering]

[Text] A study of surface iron base P/M products by gas carburizing processes shows that the hardness and wearability of iron base P/M products are greatly increased. Reasonable gas carburizing process technology for parts of sewing machines are found by means of the orthogonal test. The properties of P/M products can be modified by adding certain amounts of the alloying elements Cr, Mo, Cu, etc. (Paper received 16 Jan 86.)

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CSO: 4009/1090

OPTICAL METHOD FOR STUDYING ELECTROCHEMICAL REACTION: OXIDATION AND REDUCTION OF MANGANESE DIOXIDE FILMS

Chongqing CHONGQING DAXUE XUEBAO [JOURNAL OF CHONGQING UNIVERSITY] in Chinese Vol 10 No 1, Jan 87 pp 129-135

[English abstract of article by Huang Zongqing [7806 1350 0615] of the Department of Applied Chemistry]

[Text] The anodic deposition of manganese dioxide films on platinum in the electrolyte solution of 0.1M $MnSO_4$ + 0.017M H_2SO_4, and the oxidation and reduction reactions of MnO_2 films in 0.05M NaOH solution are studied by an optical method. The changing law of optical parameters during the electrochemical reaction processes is discussed. The changing law of the p-t and p-A curve suggests that the proportionation reactions are present during the oxidation and reduction processes of manganese dioxide films. It is markedly indicated that ellipsometry is an excellent tool for studying electrochemical reactions with solid oxide film formation and dissolution. (Paper received 31 Mar 86.)

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9717
CSO: 4009/1090

ENVIRONMENTAL QUALITY

LI PENG STRESSES ENVIRONMENTAL PROTECTION

OW030831 Beijing XINHUA Domestic Service in Chinese 1445 GMT 2 Apr 87

[By JINGJI RIBAO reporter Tuo Zhen and XINHUA reporter Wu Jincai]

[Excerpts] Beijing, 2 April (XINHUA)--Vice Premier Li Peng presided over the ninth meeting of the State Council's Environmental Protection Committee in Beijing today. The meeting adopted in principle a "State Plan for Environmental Portection During the Seventh 5-Year Plan."

Li Peng, vice premier and chairman of the Environmental Portection Committee of the State Council, addressed the meeting. He said: In the last few years, particularly in 1986, China made certain achievements in environmental protection. Environmental pollution in some localities has been brought under control, and in certain localities environmental conditions have improved. However, there are localities where environmental pollution is still very serious and becoming worse. Since our country is a socialist country, we should not take the road of "letting pollution happen first and then controlling it." Since China is a developing country, we must invest more funds in environmental improvement.

Li Peng said: We should take further steps to promote environmental protection. First, we must pay attention to legislation. All trades and all localities should formulate specific provisions, standards, and procedures for environmental protection. Second, we must improve management and have personnel who know about environmental protection and know how to manage it. Without such personnel, environmental management will be merely an empty word. Third, we must rely on science and technology. On the one hand, we should learn advanced foreign technology in environmental protection. On the other hand, we should have our own scientists and technicians develop some effective and yet less expensive technology. Fourth, we must raise funds from various sources. Some funds should be incorporated in capital construction investment, so that pollution prevention facilities and the main construction projects can be designed, built, and put into operation sumiltaneously. Some funds should be incorporated in the investment for technological transformation, and fees collected from those who dump wastes and create pollution should be used for controlling pollution. Fifth, we should advocate actual deeds and practical results. Leaders of all cities and trades should mobilize the masses to make persistent efforts to accomplish something every year in a down-to-earth way, and strive to improve environmental conditions during the Seventh 5-Year Plan.

/12232
CSO: 4008/2101

SERIOUS POLLUTION OF OFFSHORE AREAS REPORTED

HK030312 Beijing CHINA DAILY in English 3 Apr 87 p 1

[By staff reporter Xu Yanchao]

[Text] A report from the National Environment Protection Administration says some of China's offshore areas have been seriously polluted. It warns that the situation could get worse by the year 2000.

The report was drafted by a group of environmental experts headed by Yu Yongquan, the administration's deputy division chief.

Yu said the northwestern section of the Yellow Sea was the worst affected area.

He told CHINA DAILY that sea pollution was mainly caused by dumping industrial wastes and sewage from coastal cities and crude oil leaking from foreign tankers after accidents in China waters.

Since 1978, there have been 18 accidents involving oil tankers, causing 21,000 tons of crude oil to leak into Chinese waters, polluting a large offshore area.

The most serious pollution occurred after the Panamanian tanker M/TFEOSO Ambassador struck a reef in Jiaozhou Bay near Qingdao in Shandong Province in November, 1983. Then 3,300 tons of oil were spilled, polluting a large area.

Ten months later, another Brazilian tanker had an accident near Qingdao, leaking 800 tons of oil. The two accidents all occurred near Qingday, "making a complete mess of 120-kilometre coastal strip from Laoshan Mountain to Nugu Mountain," he said.

The oil leakage polluted not only marine fish farms but also tourist beaches. The government has spent a lot of money cleaning the beaches.

Sea pollution has caused a gradual reduction of marine life in offshore areas.

Between 1961 and 1963, Yu said there were 171 species of marine organisms in the intertidal zone on the eastern shore of Jiaozhou Bay. Now there are only 17 species left.

He warned if China does not protect the environment the problem of pollution will be more difficult to solve than the population problem by the year 2000.

/12232
CSO: 4010/2017

ZHOU GUANGZHAO ON CAS REFORMS

HK261426 Hong Kong LIAOWANG OVERSEAS EDITION in Chinese No 12, 23 Mar 87 pp 3, 4

[Article by staff reporter: "President of Chinese Academy of Sciences Zhou Guang Zhao Discusses Acceleration of Reform of the Science and Technology Structure"]

[Text] The wave of reform is now rolling with full force throughout the country. The Chinese Academy of Sciences is at a historic moment of changes. Its task is how to arouse and organize all its staff to serve the country's economic construction to create a virtuous circle between scientific research and production while maintaining a crack force for carrying out basic research work and pursuing high technology.

Zhou Guangzhao, a world-renowned theoretical physicist, made great contributions to China's success in producing atomic and hydrogen bombs in the 1960's. The newly-appointed president of the Chinese Academy of Sciences, who is rousing himself for vigorous efforts to make the country prosperous, recently talked with this reporter about the background and target of reform being carried out in the academy.

The Direction of Reform

Zhou Guangzhou said: When reporting work to the State Council in 1984, the Chinese Academy of Sciences put forward a proposal for reform, suggesting development in the direction of opening up to the outside world and facing the whole country and whole world. On the afternoon of 11 Febraury this year, we briefed Premier Zhao Ziyang on the situation of reform in our academy. After inquiring after something about reform, he said: The direction of your reform plans is right and you may continuously sum up experience in practice. You should concentrate your main efforts on dealing with major problems and put other aspects of work in their proper place. Premier Zhao also encouraged us to persist in wnat we are doing. As long as the direction is right, he said, good results can certainly be achieved within a few years.

The principal aim of reform is to fully arouse the initiative and creativity of scientific research institutes and research workers in an effort to promote scientific research to serve economic construction while maintaining a crack force to pursue high technology. This is a historical necessity that has been

proved by wide contacts between research institutes and enterprises. On the other hand, economic construction badly needs science and technology. For example, the Xiamen Sensitization Company, Ltd. imported a set of equipment, but due to lack of technological force, it has to buy raw materials worth 10 million yuan from abroad every year. Being aware of the situation, we dispatched more than 40 scientific and technological workers and mobilized some of our research institutes to aid the company in tackling key problems with the help of a jointly-established laboratory.

Through hard work in recent years, scientists of our academy have achieved many successes in applying theory to practice. For example, 13 scientific and technological workers, including Zhao Zhongxian and Chen Liquan, of the Institute of Physics under our academy have made a great breakthrough in obtaining superconductors with low critical temperatures, long a target of world scientific and technological circles, thus raising our country's level of superconductor research to the world's advanced level. Moreover, our staff have also recorded dramatic achievements as high as the world's advanced level in research on artificial crystals, BGO and NAD. These facts prove that the Chinese Academy of Sciences has a reliable contingent of competent scientific and technological workers, and that as long as the direction is right, this contingent can make due contributions to China's science and technology.

Zhou Guangzhou pointed out: To meet the needs of scientific and technological development, we must also carry out reform. Science and technology are not well developed in our country. To tackle key scientific and technological problems under a clearly directed target, we must reform the old structure, which restricts the activities of research personnel and institutes. Through reform, we will be able to resolve the problem of separating scientific and technological research from economic construction and spark the enthusiasm of the 80,000 staff of our Academy of Sciences in order to meet the needs of opening up to the out side world and coordinating their efforts in a flexible way.

Steps Toward Reform

Referring to concrete steps toward reform, Zhou Guangzhao said he plans to move more than two-thirds of the academy staff to major fronts. Research institutes under the academy should take an active part in developing some types of enterprises, especially technology-intensive enterprises; otherwise, they will lag far behing the world. Some research workers should leave their offices and join industrial departments to promote competitive items in the world market, thus coordinating scientific research, development, production, marketing, and service.

During the Seventh 5-Year Plan, the major tasks for the Chinese Academy of Sciences are to tackle key problems concerning major scientific and technological projects; take an active part in technological transformation of conventional industries and help enterprises digest and assimilate imported projects for self-use; to take an active part in exploiting and developing technology-intensive enterprises in the form of making research, development, production, marketing, and service in a coordinated process in cooperation with enterprises in a effort to open up the world market; and to strengthen research work in natural

resources, environment, ecology, and large agriculture and to accumulate basic data in these areas to provide a scientific basis for cultivation of the country's land, exploitation of natural resources, environmental protection, regional planning, all-round development of agriculture, and for policy decisions about major construction projects.

However, we will keep one-fourth of our forces to strengthen basic scientific research work and engage in scientific pursuits of high technology. We must not slacken our efforts in this aspect of work. To enable our industry to catch up with the workd's advanced level, we should not neglect basic scientific research work. When doing so, we will take every opportunity to guide basic scientific research in the direction of development and production.

Reform in Three Aspects of the Science and Technology Structure

To achieve these tasks Zhou Guangzhao said, we will carry out the following reform in structure:

1. We will base technological exploitation and some applied research work on market demands, we will cooperate with our joint enterprises and set up high-tech companies by ourselves or with foreign funds to directly turn the results of scientific and technological research into competitive commodities in the world market and contribute to developing our country's technology-intensive industry. Starting this year, we will support and encourage scientific and technological workers to join companies and enterprises in various forms.

2. We will readjust some of our research institutes engated in natural resources, environment, ecology, and large agriculture and develop them into some centers so that they will become better able to engage in comprehensive scientific and technological research. These centers, under the dual leadership of both the Academy of Sciences and the relevant comprehensive economic departments or local governments, will give priority to the fulfillment of the tasks assigned to them by the relevant economic departments or local governments. As a trial step toward the reform, the Shenyang Academy of Sciences has dispatched 11 scientific and technological workers to rural areas to work as deputy heads of counties, our research workers have drawn up plans for solving the mercury pollution problem in the Songhua Jiang, and the result of our research on some problems concerning the construction of Gezhouba has saved a large amount of investment for the state.

3. We will build a state research laboratory or state scientific project center and some laboratories jointly run with unviersities and colleges to meet the needs of the new structure. In addition, we will encourage our research institutes to strive for foreign financial aid and cooperation to build a world research center.

Future Structure of the Academy of Sciences

Zhou Guangzhao said: From a long-term point of view, the Chinese Academy of Sciences will comprise the state scientific project center, joint laboratories, and research and development organs of high-tech enterprise groups to form a

state comprehensive research center of natural sciences. Its main tasks are: Work hard in the fore of science to raise our country's scientific and technological level, develop new technologies to promote the formation and development of our country's high-tech industry, give full play to the role of different branches of learning to assume the major state tasks, accumulate scientific data to provide a scientific basis for handling major problems in economic construction, and train personnel for other departments concerned. All research institutes under the Academy of Sciences should open up to the outside world and face the whole country.

In conclusion, Zhou Guangzhao said: Reform should be carried out under party leadership. We should follow the socialist road and implement the "double hundred" policy to enable scientists to express their views without reservation on academic problems. This means that we must encourage scientists to think independently and make free exploration. In the process of reform, we must seek truth from facts, and properly handle the relationship between the old, the middle-aged, and the young. The middle-aged will remain the backbone of the scientific and technological contingent for 5 years, but we should create conditions for the young to mature as early as possible. Meanwhile, we must unite with all the forces that can be united to run the Academy of Sciences well. The system of job responsibility will be applied to all heads of research institutes during their future tenures of office.

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CAS PHYSICISTS PRODUCE LIQUID NITROGEN SUPERCONDUCTOR

HK010452 Hong Kong ZHONGGUO XINWEN SHE in Chinese 0347 GMT 27 Feb 87

[Report by reporter Qin Lang (4440 2597): "A Dream of Mankind Has Come True--Interview With Physicist Guan Weiyan"--ZHONGGUO XINWEN SHE [headline]]

[Excerpts] On 24 February, the Chinese Academy of Sciences announced that a research group headed by Zhao Zhongxian and Chen Liquan, both associate research fellows of the Institute of Physics, had succeeded in producing a kind of superconductor which starts functioning at a transition temperature above absolute temperature 100 degrees (100 degrees Kelvin). The following day this reporter interviewed Guan Weiyan, a well-known physicist and division director of the Chinese Academy of Sciences. Guan was invited to say something about this epoch-marking achievement.

"In the field of contemporary physics, it is generally acknowledged that there are two most attractive topics," Guan Weiyan said. "The first topic is the controlled thermonuclear reaction which can supply mankind with almost inexhaustible energy. The second is the search for high-critical-temperature superconductors--superconducting materials with no electric resistivity which can save immeasurable energy and, at the same time, initiate revolution in many scientific fields."

"Superconductivity" is a state of electric conducting materials in which the electric resistivity becomes zero. Scientists' research in this field has resulted in slow progress since 1911 when a Dutch scientist discovered the phenomenon of superconductivity. During the 74 years up to 1985, scientists only managed to raise the transition temperature for superconductivity from 4 degrees Kelvin to 23 degrees Kelvin. On the average it took around 4 years to raise the transition temperature by each 1 degree. A superconductor functioning within the liquid nitrogen temperature range (above absolute temperature 77 degrees) is something that scientists have long been dreaming of. By 1984 some Japanese scientists still predicted that this dream would not come true until early 21st century.

The 58-year-old Guan Weiyan is a native of Nantong, Jiangsu Province. He graduated from Moscow University of the Soviet Union in 1957, and then worked for 3 years at the world-renowned Physics Research Institute of the USSR Academy of Sciences before he received an associate doctoral degree. Guan has been engaged in the research of low-temperature physics and superconducting

material since his return to China. He became the Director of the Institute of Physics at the Chinese Academy of Sciences in 1981 and was elected a division director of the academy in the same year. He had been the president of the University of Science and Technology of China before January this year.

Guan Weiyan said: Thanks to the efforts of Zhao Zhongxian, Chen Liquan, and two other American scientists of Chinese descent Zhu Jingwu and Wu Maokun, we can now use low-priced liquid nitrogen in place of liquid helium to obtain superconductivity. So, many superconducting techniques that were formerly infeasible due to the high costs of liquid helium refrigeration are now likely to be applied to scientific experiments and production. Superconductivity technology can be applied to the manufacture of highly sensitive testing devices. These devices, with their precision standard upgraded several orders higher than what the existing instruments have reached, can be used in mineral prospecting, medical practice, and research of sophisticated technology. Computers incorporating superconductivity technology will be able to compute even faster than the fastest computers available today. The superconductivity technology can also be applied to the development of high-speed magnetic levitation train, long distance loss-free transmission of power, and the high-speed ship propelling. Above all, the superconductivity technology can be used to build a new generation of particle accelerators. Besides, the use of a superconductor in generating a strong magnetic field is the only practical means to obtain a controlled thermonuclear fusion reaction.

Guan Weiyan attributed the Chinese scientists' success in the research in superconductivity to the efforts by research personnel and the government's devotion to basic research. "To cite two examples," he said: "First, in 1978, when drawing up a national physical research plan, the departments concerned listed the study of high-critical-temperature superconductor as one of the five key projects in solid physics research. Facts have shown that this was a far-sighted decision. Second, since 1976, six national symposiums on research in high critical temperature superconductor have been held in China. The State Natural Science Foundation, which started working last year, made an appropriation of over 300,000 yuan for the study of superconductivity and other relevant research projects. It is due to these efforts that we have managed to maintain a contingent consisting of a considerable number of scientists in China to carry on both the basic and applied study of superconductivity."

Guan Weiyan proclaimed the breakthrough in the study of superconductivity achieved in the past couple of months as the common glory of the Chinese nation. He recalled his first meeting with Mr Zhu Jingwu, an American scientist of Chinese descent, at the 15th international conference on low-temperature physics held in France in 1978. They met again many times later. Guan travelled to the United States, where Mr Zhu lives, twice in 1981 and 1985 to give lectures at and 59 visit the University of Houston. During his visit he got to know Mr Wu Maokun. Guan Weiyan admitted that Mr Zhu Jingwu is a scientist with a world reputation in the field of superconductivity, having displaying much originality and being highly sensitive to new matters.

As a physicist, Guan Weiyan is still engaging in the research of low-temperature physics now. At present he has set to working on three topics, including "new superconducting material made by mixing iron beams" and "amorphous superconductor." Smiling, he said: Returning from the University of Science and Technology of China, I thought I could "relax" for a while. But it is just contrary to my expectation. As vice chairman of the academic committee of the Institute of Physics, Professor Guan is now busy with the triannually assessment and readjustment of research topics at the institute. Right now two PH.D. candidates are working under him at the institute. In addition, he is also the supervisor of two PH.D. candidates and a master course student from the University of Science and Technology of China. When this reporter arrived at Guan Weiyan's office, he, in the capacity of secretary general of the China Society of Physics, was presiding over a meeting to work out the agenda for the fourth national congress of the society. Former vice president of the University of Science and Technology of China Fang Lizyi also participated in the meeting as a member of the Third Council of the Society of Physics.

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COUNTRY'S INSTITUTE OF SPACE TECHNOLOGY HIGHLIGHTED

Beijing HANGTIAN [SPACEFLIGHT] in Chinese No 1, 26 Jan 87 pp 3-6

[Article by Yang Cunheng [2799 1317 1854], Zhou Ziyuan [0719 1311 0337], and Wang Fengyun [3769 7364 0061]]

[Text] China's Institute of Space Technology is the primary organization for developing space vehicles and space technology. Its responsibilities include the design, manufacturing and testing of space vehicles, basic and applied research of space technologies, and application and promotion of space technologies. During the 19 years since its establishment, with the support of organizations across the nation, it has successfully designed and built 19 artificial satellites, and has made significant contributions in the areas of satellite manufacturing technology, satellite recovery technology, multi-payload technology, and geosynchronous communications satellite technology.

The Cradle of Artificial Satellites

On 17 May 1958, China's great leader Mao Zedong made the announcement that China must begin its satellite program. In 1965, comrade Zhou Enlai personally directed the effort to establish a plan for developing and launching China's first satellite.

At the suggestion of comrade Nie Rongzhen, an effort was initiated to consolidate the forces assigned to the development of satellites and other space vehicles from different organizations around the country including the Chinese Academy of Sciences, the Seventh Ministry of Machine Building Industry, and the Fourth Ministry of Machine Building Industry. On 20 February 1968, the Institute of Space Technology was officially established. Since that time, the institute has become the cradle of China's satellite program.

Scientific research involves a great deal of risks and difficulties that must be overcome. During the early "political era", the first-generation scientists, engineers and party officials working on China's aerospace programs had to overcome many difficult problems. They relied on their skills, brains and persistence to build the laboratories and scientific equipment necessary for satellite development. On 24 April 1970, China's first satellite went into orbit, and China became the fifth nation with the capability of developing

and launching a satellite. When the tune "East Is Red" was transmitted back to earth, every Chinese citizen was overjoyed. This achievement was the direct result of the will power and wisdom of the Chinese people, a product of China's self-reliance policy, and marked the first milestone in China's aerospace history.

In order to gather valuable data on cosmic rays, the earth's magnetic field, the ionosphere, the atmospheric density, solar X-rays, particle radiation and infrared radiation, and to test various new aerospace technologies such as remote sensing, controls, energy resources, telemetry, temperature control and communications, China subsequently developed and launched a number of satellites for conducting scientific and engineering experiments. The scientific-experiment satellite launched on 3 March 1971 remained in orbit for more than 8 years, during which time it not only sent back to earth a large amount of data on space physics, but also conducted extended-life tests on solar cells, temperature-control shutters, and other equipment. These experiments provided reliable data which will be valuable for the development of China's aerospace technology.

On 26 November 1975, China successfully launched a retrievable satellite and on 29 November it recovered as planned; thus, China became the third nation in the world capable of retrieving a satellite from orbit. This marked the second milestone in China's aerospace history. Since 1975, China had successfully launched and recovered 8 satellites; all of these satellites returned to earth according to plan, and landed safely in the designated landing sites in China's interior region. The success rate has been 100 percent, which is considered a miracle in the history of aerospace engineering. It should be realized that satellite recovery is a highly sophisticated technology. To ensure that a satellite can be recovered safely and accurately, one must deal with a series of difficult technical problems such as heat shield, control, tracking, and deceleration. These problems are particularly difficult when the satellite must be recovered accurately within a limited region on the Chinese mainland. The large amount of pictorial data photographed by the recovered satellite have been used by government agencies in territorial surveys, resource exploration, mapping, seismic and geological inspection, archeology research, planning and site selection for railroads and ocean ports, forest development, urban planning, and environmental protection. It is clear that they have made significant contributions to the national economy.

The launch of multiple satellites with a single carrier rocket is a new thrust in China's aerospace technology. The satellites are equipped with dozens of instruments for measuring the earth's radiation belt, the atmospheric density, the ultraviolet and infrared radiation, the solar X-rays and ultraviolet rays, and the high-altitude magnetic field; these measurements greatly enhanced China's data base on space physics. In addition, tests were also conducted on new satellite technologies such as sun-sensing attitude control systems, solar panels, and high-capacity magnetic storage devices; these technologies provided the technical foundation for developing new space vehicles in the future.

In particular, geosynchronous satellites use some unique technologies which are not found on other satellites. For example, a high-precision control system is required to accurately maintain the satellite at a designated location; an orbit-changing engine is required to move the satellite from a transfer orbit to geosynchronous orbit; the directional antenna on the satellite always must be pointed toward the earth in order to relay communication signals; a high-capacity energy source is required to power the on-board electronic equipment; also, a new temperature control system is required for the geosynchronous satellite to operate under a wide range of environmental conditions. Therefore, an important measure of a nation's strength in aerospace technology is its ability to launch geosynchronous satellites. On 8 April 1984 and on 1 February 1986, China successfully launched and operated two geosynchronous satellites; this marked the third milestone in China's aerospace history.

Aerospace technology involves a high degree of technical risk, highly complex systems, large investments, and a long development cycle; it is also a technology that requires a high degree of integration, sophistication, and reliability. A space vehicle generally consists of several subsystems; each subsystem is composed of several modules; and each module contains a number of components. Once in orbit, the vehicle must be able to withstand the hostile space environment without maintenance or repair. A damaged component, a broken wire, a cracked conduit, a small piece of debris or even loose solder in an electronic component may destroy the entire vehicle. Therefore, the success of China's Institute of Space Technology is attributed to every scientist and engineer, every technician and every Party official involved in the satellite development program.

Early Accomplishments of the Institute

The development of aerospace technology is a huge system engineering effort. Each subsystem must perform its unique function, and all subsystems must be closely coordinated. Aerospace technology involves many disciplines of the most advanced natural sciences. Therefore, in order to establish the Institute of Space Technology as an independent research and development organization, many research offices must be set up to carry out the development and tests of all the subsystems of the space vehicle.

Over the years, the Institute of Space Technology has established a number of special research offices and special manufacturing facilities. They include: the integrated spacecraft design department, 10 different research offices devoted to such fields as aerospace control engineering, space electronic technology, vacuum and low-temperature physics, satellite information engineering, satellite environmental test engineering, test and measurement science, and electro-mechanical science, and 3 special factories devoted to overall satellite assembly, development of satellite test equipment, and development of satellite telemetry systems. All 19 satellites launched by this country were designed and built by these research offices and factories.

As part of China's aerospace activities, The Institute of Space Technology had also developed a team of experienced, hard-working and highly skilled spacecraft builders. This team includes the internationally known experts such as Yang Chi, Wang Xiji, Du Shancheng, as well as many Chinese-trained aerospace specialists. Having accumulated 20 years of experience since graduation from college, many comrades have moved into leadership positions in their respective fields; the majority of them have become the driving force in spacecraft development. Today, they not only continue to play an important role in the development of China's aerospace industry, but have also assumed the responsibility of training the next generation of scientists and engineers. The ex-director Sun Jiadong and current director Min Guirong of the Institute are good examples of the members of this team.

In addition to satellite development, the Institute of Space Technology is also involved in the research and development of various basic sciences and technologies. In satellite structure, it has accumulated considerable experience not only in the design and production of conventional aluminum alloy structures, but also in the use of titanium alloys, molybdenum alloys, as well as graphite composite materials, fiber glass and other non-metallic materials; in the area of temperature control, it has conducted tests not only on passive techniques, but also on active techniques such as heat pipes, venetian blinds, and phase-change materials; in the area of attitude control, it not only has applied single spin-stabilization technique, but has also built and tested dual spin-stabilization, gravity-gradient and three-axis stabilization systems; in the area of control mechanisms, it not only has used single-element chemical propulsion systems, but has also built and tested dual-element propulsion systems, electric rocket motors, and other types of mechanisms; in the area of power supply, it not only has used short-duration chemical batteries, but has also tested and used silicon solar cells and hydro-oxygen batteries; in the area of satellite tracking and measurement, it has developed integrated systems which can be used for satellites in low, medium or high altitude orbits; in addition, it is also involved in the basic research of various aspects of manned space flight.

With regard to satellite technologies and experimental facilities, the Institute has developed and launched various types of experimental satellites in different orbits and designed for different applications; it has conducted tests on new technologies for various subsystems; in addition, it has built the necessary ground facilities for spacecraft development, which include a large thermal vacuum chamber 7 stories high, a large vibration test facility and a vertical dynamic balance machine, a 400-kg to 5 ton electro-magnetic vibration table, various models of centrifuges, an impact table, and a precision rotary table. All of this equipment is of comparable quality to that on the international market; it is essential for building high-performance satellites.

After 19 years of development and improvement, the Institute of Space Technology has become a mature institution with recognized stature. The aerospace technology in China has shifted from the experimental phase to the application phase; it is making increasingly greater contributions to the "Four Modernizations."

A Leading Industry

Aerospace technology is an important measure of a nation's economic and technological strength because development of the aerospace industry can stimulate the growth in other parts of the national economy.

In an effort to stimulate the growth of the national economy, the Institute of Space Technology is evolving from a simple research and production unit to an organization involved in research, production, development and management. In addition to transferring many of the scientific achievements to other sectors of the national economy, it is also providing commercial products to the domestic and international markets. According to preliminary statistics, the Institute has developed in recent years more than 300 commercial products to satisfy the needs of various industries of this country. Many of these products have reached a standard comparable to that of similar products on the international market. Examples include the heat-pipe heat exchanger used in textile factories, timers for washing machines, temperature measuring and control systems for breweries, bias control devices used in factories producing photo-sensitive materials, and laser seismometers.

In addition, it has also developed more than 20 high-technology products which include a series of heat pipes, a medical X-ray television system, industrial controllers, new electron-beam engravers, a satellite receiving station, a catalytic combustion unit, a radio-helmet intercom, magnetic transmission, a computer control system for variable power transmission, a micro-processor control system for water supply and brewing plants, a micro-processor control system for small chemical fertilizer plants, and an open-circuit television system. These high-technology products and commercial products effectively eliminated the problems of obsolete production procedures, poor quality and environmental pollution of the older factories. Eighty-four of the institute's products have received awards from the state and from the NDSTIC.

International Exchanges

Since 1978, China's Institute of Space Technology has opened its doors to the outside world and adopted a policy of international exchange and cooperation. Contacts with the international aerospace community are increasing daily.

The institute maintains a friendly relationship with NASA, the French Space Center, the European Space Agency, the Aeronautical and Space Research Institute of West Germany, and the Japanese Space Industry and Development Group; it frequently sponsors mutual visits and conferences with these organizations. Through contacts with foreign companies and industrial groups, the institute has greatly benefited in terms of acquiring new knowledge, broadening its horizon, developing new concepts, and learning new experiences and technologies. It has also participated in several cooperative activities.

The Institute of Space Technology is currently developing a new generation of application satellites which include high-capacity communication satellites, multi-purpose earth resource satellites, various types of weather satellites and other complex aerospace engineering projects. In other words, it is making greater contributions to the four modernization programs and to the national economy.

ACHIEVEMENTS AWARDS SET RECORD AT QINGHUA UNIVERSITY

Beijing KEJI RIBAO in Chinese 2 Feb 87 p 1

[Article by Li Jing [2621 0352]: "Qinghua University Reaps Bumper Crop of Achievement Awards"]

[Text] Qinghua University won more awards for scientific research achievement in 1986 than in any previous year, due to its firm adherence to this research principle: "make use of comprehensive advantages, orient oneself to economic construction, pay attention to basic research, and strengthen lateral associations with enterprises and other units."

In 1986, 6 of the university's research achievements received national scientific and technical achievement awards and 168 won ministerial, commission, provincial, or municipal awards. A host of innovations by the university, such as "radar programmable digital signal processor," "16K SRAM," and "testing technology and experimental implantation of the valve of an artificial heart" were highly regarded and well received by experts at home and abroad. Meanwhile, soft science research has also obtained gratifying results. A key national project, "a forecasting model for medium- and long-range national energy demand," invented by the university's Nuclear Energy Institute, has been tried out by the proper leading organizations. Experts commented on the model thus," The nation's first large-scale multi-level energy model is on par with international standards both structurally and theoretically." Some of the award-winning achievements have paid handsome economic dividends, winning the Class 3 national invention award, generating economic results exceeding 50 million yuan annually. To encourage the prompt translation of research achievements into direct productive forces, the university has awarded the fourth "scientific and technical achievement dissemination and application prize" to the researchers of seven achievements each with annual economic results topping 1 million yuan.

The university applied for 51 patents in 1986 and was awarded 52. Of its research achievements, 167 were technically appraised and submitted to the authorities above. Not long ago a meeting was held at the university to present awards to people responsible for scientific research achievements and outstanding papers. Twenty-two theoretical achievements won the "Qinghua University outstanding academic paper prize" for 1986.

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SCIENTIST-ENTREPRENEUR DISSEMINATES NEW TECHNOLOGY

Beijing KEJI RIBAO in Chinese 7 Feb 87 p 1

[Article by Xie Ning [6200 1337] and Zheng Haining [6774 3189 1337]: "Founder of Private Research Organization Dares to Take Risks"]

[Text] Although he has paid a heavy price and encountered all sorts of difficulties and setbacks, Chen Chunxian [7115 2504 0341], founder of the first private scientific research organization at Zhongguan Village in Haiding District in Beijing, is still not entirely out of the woods yet. However, almost 100 companies have assimilated and learned from his experience and lessons as a member of the first crop of entrepreneurs of the scientific researcher mold to emerge. Chen Chunxian did not call it quits after one setback; right now he is rallying his forces to continue to contribute to the dissemination of new technology.

Chen Chunxian, 52, is a member of the CPC. He graduated from the physics department of Moscow University in 1958. After returning home, he joined the Physics Institute of the Chinese Academy of Sciences to do research and was promoted research fellow in 1978. An outstanding scientist in plasma research, Chen Chunxian has toured three times Silicon Valley and Interstate 128 in the United States from which new technology radiates. Impressed by the rapidity with which scientific research achievements are converted into productive forces, Chen Chunxian was determined to break the bondage of the existing scientific and technical management system and, putting his belief into practice, proceeded to search for a way to disseminate new technology in a socialist economic environment.

In October 1980, Chen Chunxian founded the Beijing Advanced Technical Development Service Company and began disseminating new technology, consulting, and developing new products on a part-time basis. Many people at the time did not understand his actions. They said that he was not "engaged in honest work" and suggested that he was into something "shady." Some people even condemned him as a "second-hand dealer in science." His service company ran into difficulties and he also came under investigation. Leading comrades on the CPC Central Committee, however, fully affirmed his actions and pointed out, "Chen Chunxian took the lead in ushering in a new situation. In so doing he may have charted a new path to translate scientific research achievements into direct productive forces more rapidly, and to open up a new channel to

help scientific and technical personnel contribute to the four modernizations. A number of scientific and technical personnel with authentic achievements may become rich ahead of others, smashing the 'iron rice bowl' and breaking the habit of 'eating out of the common pot.'"

In April 1983, supported by the Haiding district government and Beijing Association of Science and Technology, Chen Chunxian set up the first private scientific research organization at Zhongguan Village: Beijing Huajia New Technical Development Research Institute. Forgoing government investments, he relied on a 100,000-yuan loan from Haiding district. In just 1 year he completed 15 technical development projects.

As a scientist engaged in technical economic activities, Chen Chunxian did not have the necessary mental preparation for the many difficulties encountered in the course of running an enterprise. Nor did he have managerial experience. Huajia Research Institute lacked a fairly comprehensive managerial system. Everybody in the institute did his own thing. Financial management was chaotic. Some projects were not properly run and did not have a clear sense of direction. Besides, national economic legislation at the time was neither sound nor complete, which dragged the institution into several economic disputes. The institution and its affiliated enterprises found themselves in a beleaguered state.

Confronted with this serious setback, Chen Chunxian did not lose heart. On the one hand, he presented his case to the courts, hoping to find a legal solution. On the other hand, he went over his experience, improved management, and, with his revamped institute as the basis, set up a joint organization combining technical development, production, trade, and services. In conjunction with high tech companies in the United States and Hong Kong, he also started Huajia Silicon Valley Information Systems, Ltd, which has now set up a data input and processing base and undertakes jobs in data processing for foreign clients. Moreover, it has successfully manufactured two high-speed signal processors which can be used in high tech and have been adopted by almost 100 scientific research and educational units at home. At present the enterprise is working on a multi-function data communication and processing system suitable for use by grassroots units.

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SCIENCE OF SCIENCE PIONEER DISCUSSES SPECIALTY

Beijing LIAOWANG OVERSEAS EDITION in Chinese No 5-6, 9 Feb 87 pp 45-46

[Article by reporter He Yanping [0149 4291 1627]: "Science of Science is a Product of the Times; Interview with Feng Zhijun, Professor of Science of Science"]

[Text] A large group of workers in soft science gathered at the Shanghai Hengshan Hotel on 20 January to appraise the "general model for technical transformation in Shanghai and its simulation." This model is yet another piece of inquiry by the best and brightest in the science of science. It provides a research methodology combining a logical model, a mathematical model, and simulation, and applies it to the realm of strategic planning. By designing a model of technical transformation, scientists seek to bring about changes in Shanghai's industrial structure that will help the city alter its direction of industrial development, that is, make key industries the backbone and hence the engine that drives the development of a series of related industries. The result will be an organic entity made up of closely integrated interdependent parts. The basic output of the model's operations is several feasible investment plans for technical transformation in the Seventh 5-Year Plan. This model serves as a scientific basis for the formulation of long-range plans for Shanghai's scientific, technical, economic, and all-around developments. This reporter recently interviewed Professor Feng Zhijun [7458 0037 3182], who was in charge of the project.

Professor Feng Zhijun, 49, is currently director of the Science of Science Research Institute in Shanghai, an adviser to the Baoshan Iron and Steel Complex, a member of the Chinese People's Political Consultative Conference, and vice chairman of the central committee of the China Democratic League. He has attended several international academic conferences, including the 10th international sociological conference in Mexico in 1982 and a seminar on "the world situation and modernization in China" in the United States, where he presented a paper entitled "The Strategy of Scientific, Technological, and Educational Development in China" that drew the attention of scholars at the Aspen Humanities Society in the United States Professor Feng Zhijun has also been invited to lecture abroad. At present he is supervising 10 graduate students and over 30 assistants, and writing or co-authoring more than 30 books and numerous papers.

Science of Science Taking the World by Storm

"Ever since Copernicus put forth the theory of cosmic motion, natural science and social science have confronted each other for over 500 years. Two issues kept them at loggerheads at the time: predictability and the repeatability of experiments. The considerable progress made by natural science laid the foundation for the converging and merging of the two disciplines. From then on, science of science began its splendid chapter." Then Professor Feng Zhijun briefly explained the history and present state of science of science.

As its name suggests, science of science is primary science. It is principally concerned with the intrinsic attributes of science and explores the laws of scientific development. From the perspective of science, science of science is a kind of introspection, comparable to an adult who looks back on his years and realizes the meaning of life. Science of science was born in 1925, but it had little impact, like a "a wind which rises suddenly only to wrinkle a pond of spring water." As the wheel of history turned into the 1960's, science was developing by leaps and bounds, science became socialized, and society was studied like a science. Meanwhile, science had produced such side effects as ecological imbalance, environmental pollution, and urban overcrowding. All this touched off a public reflection on science. It was against this backdrop that science of science caught the eye of the world.

Science of science is a wide-ranging soft science with numerous branches. In recent years, strategic studies, in particular, have been all the rage the world over. Both foreign and domestic scholars have launched strategic studies using different methods, from different perspectives, at different levels, and in different areas. As far as the nature of these studies is concerned, there are strategic studies on a global scale, development strategy for developing nations, strategy of growth for economically developed nations, strategic studies by the Soviet Union and Eastern Europe, and strategic studies on coordinated socialist development with Chinese characteristics. In terms of level, they can be classified into strategic studies at the international, national, regional, sectoral, and enterprise levels.

At present over 500 scientific research institutions specializing in science of science have been set up all over the world and a crop of well-known scholars has emerged from among the 3,000 scientists engaged in research in this discipline.

The Present State and Development Trends of Science of Science

"It took the genius of Goethe 60 years to craft 'Faust.' Asked to sum up its theme in one sentence, Goethe said, 'He who makes unremitting efforts to improve himself will triumph in the end.' That happens to coincide with this saying in China's own 'Book of Changes,' 'God favors those who constantly strive to make themselves stronger.'" Explaining the spirit of the Chinese scientific community regarding research in the field of science of science, Professor Feng Zhijun said, "As early as the first part of 1950's and 60's, there were individuals in China who were making an effort at research, but large-scale research only came in the wake of the national scientific conference in 1978. The translations of writings on science of science, such

as 'Science, Technology, and Society in 17th Century England' by (Mo Lai), 'The Social Function of Society' by (Bei Er Na), 'Science of Science' by (Pu Lai Si), and 'The Power of Knowledge: The Social Dimension of Society' by (Ji Man) also served as a bridge making possible the entry into China of science of science. Setting a trend, some of the best and brightest researchers in natural science and social science converged on science of science from all disciplines. Nationwide there are now almost 50 research institutes and centers, with about 3,000 researchers. In 1981, moreover, a special magazine on the subject, KEXUEXUE YU JISHU GUANLI, was launched, and research institutes in various provinces and municipalities also put out similar publications. As science of science research gains depth, it becomes its special feature to investigate how to establish a science of science with Chinese characteristics and make it serve socialist construction. Chinese experts on science of science have written over 100 books and attended several international academic conferences. Their research topics have a definite measure of sophistication."

"As a burgeoning science, science of science should concentrate on research in these three areas in the future. First, we should consider science of science as an integrated system of knowledge and study its structure, internal links, development process, and laws of operation. Second, we should view scientific activities as independent social activities and study their structure, internal links, development process, and regular laws. Third, we must examine its interactions with and impact on other systems of knowledge, scientific activities, and other social activities. Ultimately, however, research should revolve around the search for a Chinese-style socialist road."

Exploring Science of Science

"To explore science of science, one must devote to it the energies of a lifetime. He must also have solid expertise." Professor Feng Zhijun explained that he came to science of science via a circuitous route. He had been interested in the humanities from a young age. But things do not always turn out the way one hopes: In college, he found himself admitted into the department of architecture. Upon graduation, he stayed on to teach and became the youngest "monster and demon" during the Cultural Revolution. He said, "I was studying very hard. It so happened that science of science was sweeping the world. I felt that this discipline suited me very well. It requires not only a knowledge of natural science, but also a foundation in social science and the humanities. So I went in for it, presided over the establishment of China's first research institute in science of science, wrote China's first book on science of science, a 300,000-character work, and started recruiting graduate students. I have also applied myself to the politics and methodology of strategic studies over the past few years." Professor Feng Zhijun stressed that the purpose of his research is to develop a development strategy model well adapted to China's national conditions. In other words, socialism with Chinese characteristics.

Professor Feng Zhijun noted the profound significance of group research in science of science. He said, "To set up a discipline of science of science compatible with China's national circumstances, we must make use of group research. Our ranks include people who are in logical modeling, mathematical

modeling, computer simulation, and so on. I am in charge overall, but still all of us must work hard together. Some research projects have been adopted by the organizations concerned, such as 'the model for long-range development and technical transformation in Shanghai,' 'feasibility study on the Shanghai economic zone,' 'research on national investment in intelligence and its structure,' 'the development of modern science and technology and the reform of China's institutions of higher education,' 'comprehensive evaluation of the research achievements of soft science,' and 'study on the progress and method of scientific decision-making.' All this is the result of group research." Professor Feng Zhijun said, "In a modern society, not only must science itself become comprehensive, but scientific research too must stop going it alone like a small-scale producer. Instead we should pool our intelligence and go in for intellectual collaboration. Only then will we achieve something. 'I learn from different people.' I should make this saying by Du Fu my motto."

Indeed Professor Feng Zhijun has lived up to that principle. In recent years, apart from conducting research, he has coauthored "The Foundation of Leadership Science," ""Soft Science," "Leadership Strategy," "Tackling the New Technological Revolution," and "Modernization and Science" with Jia Yulong [1115 4416 7893], vice president of the Shanghai Academy of Sciences, Liu Ji [0491 0679], vice chairman of the Shanghai Association of Science and Technology, Zhang Nianchun [1728 1819 2797], general secretary of the Shanghai Research Institute of Science of Science, Zhao Hongzhou [6392 4767 3166] of Beijing, and others. These works have been well received by leading cadres at the center and at all levels as well as by intellectuals at large. They have contributed enormously to advancing and disseminating China's science of science.

"Compared to other nations, China still falls short in science of science, but domestic economic invigoration and opening to the outside world have set the stage for its further development. Reform in China is crying for the rise of strategic studies and other branches of science of science. The flourishing of this science, in turn, will inevitably quicken the pace of the nation's forward march."

Professor Feng Zhijun finally said that as the newly elected vice chairman of the China Democratic League, he proposes to set up an advisory organization on regional development strategy under the central committee of the league to promote scientific and democratic policy-making using the league's intensive concentration of talent.

He said, "Specifically, there must be advising before policy-making, consultation during policy-making, and supervision afterwards. Right now the greatest political issue in China is the four modernizations. Only by throwing ourselves into the practice of reform and understanding China's national circumstances can our political participation have an impact where it really matters. Our consultation must touch upon vital issues and we must fulfill a democratic party's role of democratic consultation and political supervision."

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